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In This Issue: Windows MIDI, 3DO, Amiga At Warner Bros., And More

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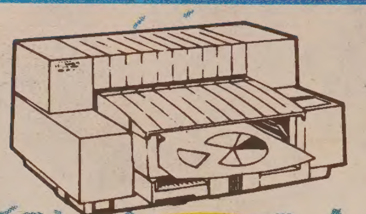

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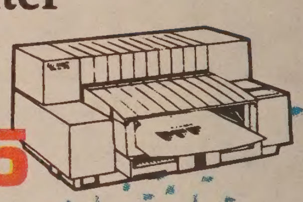

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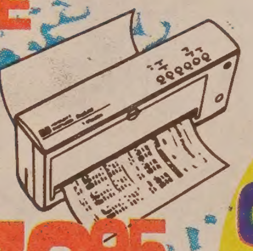

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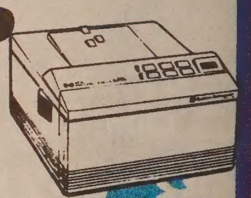

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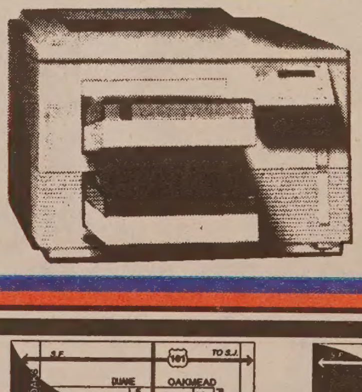

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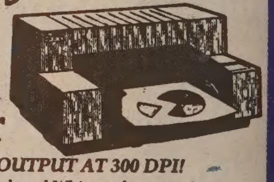

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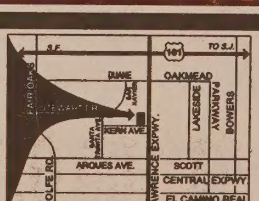

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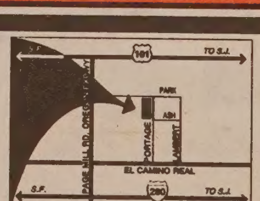

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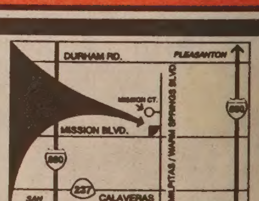

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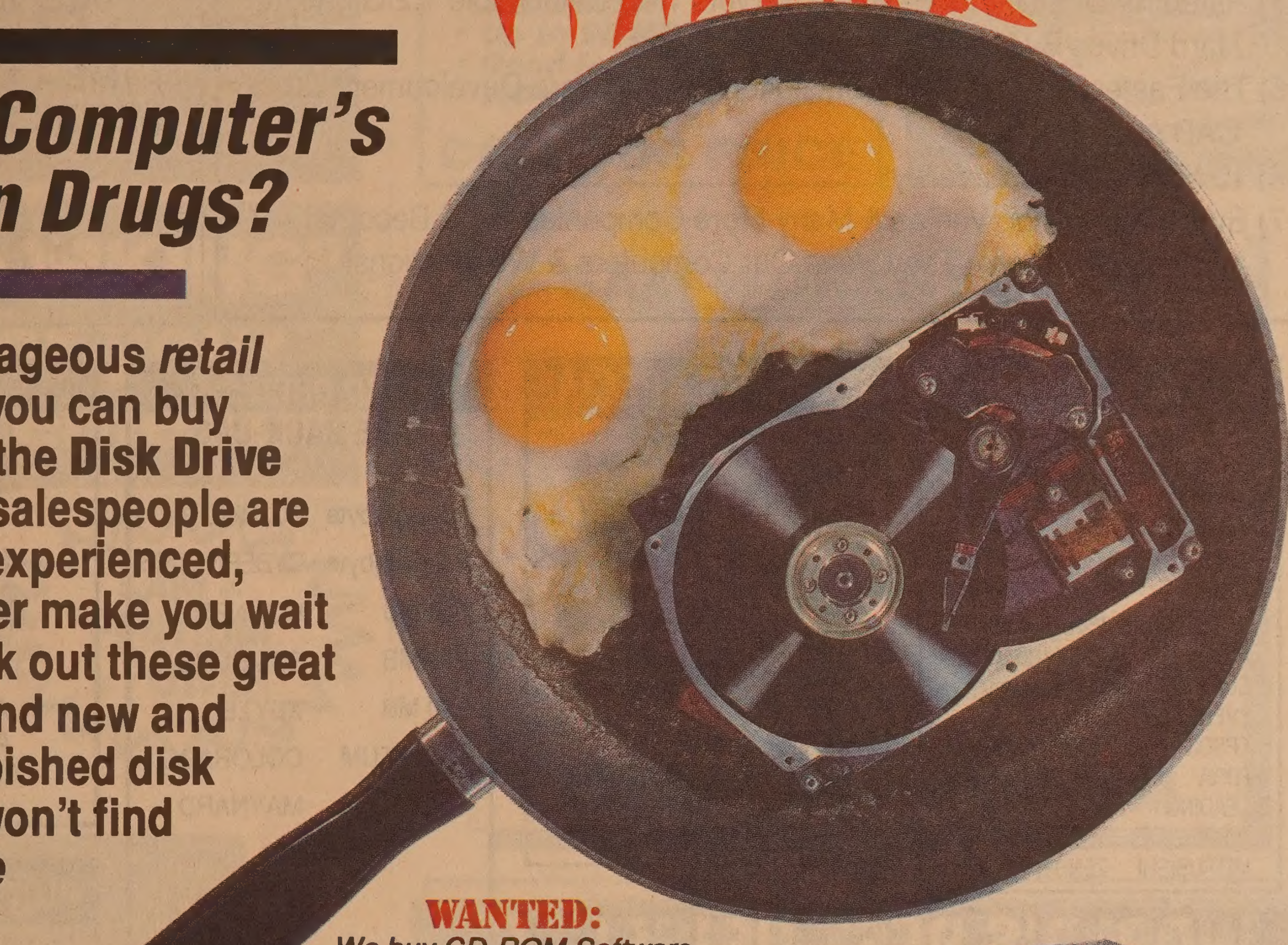

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A multinational, multi-organization effort, COMPUEXPO is based on the premise that the next ten years of the computer industry will not be dominated by a few key players; rather, it will be characterized by complex alliances among entrepreneurs, manufacturers, and other service providers in order to create market differentiation and added value. We talk to some of this year's organizers, including CompuExpo president Allen Yu, starting on Page 74.

—ME

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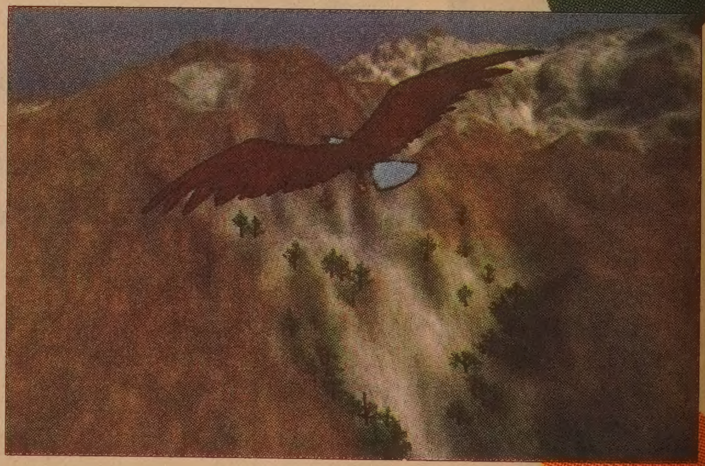

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Correction

In our delight at being able to bring you Mitch Kapor's "Computer Spies" in Issue #106, we neglected to note that Mitch Ratcliffe, Editor-at-Large of *MacWeek*, provided research assistance for the article.

We apologize to both Mitches, and eagerly await their next contribution, which should be along next month…

—Eds.

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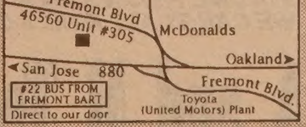

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Jim Warren founded assorted computer industry institutions and serves as a member of Autodesk's board of directors. He's currently involved in the issue of public access to government records.

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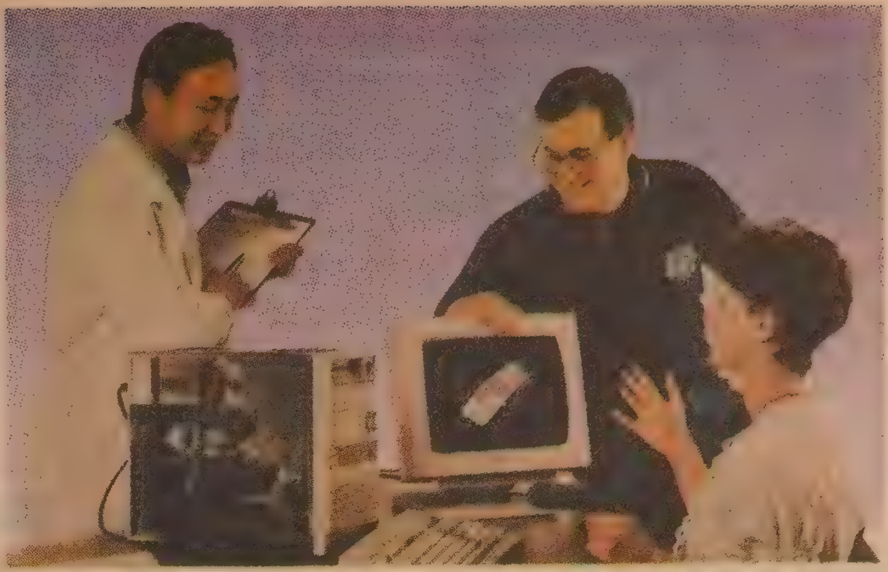

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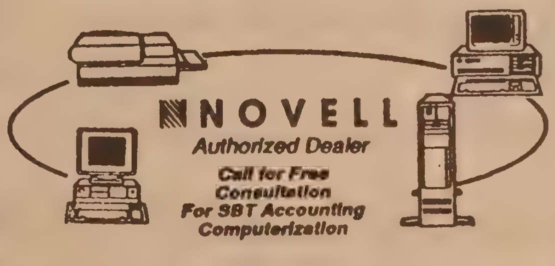
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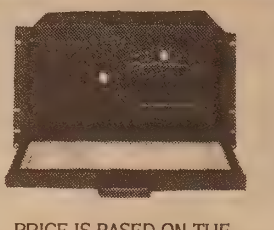

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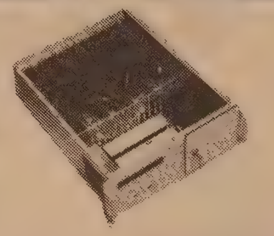

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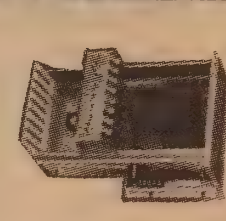

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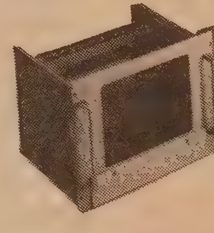

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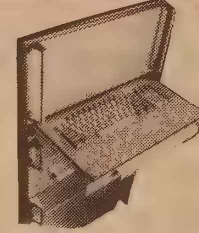

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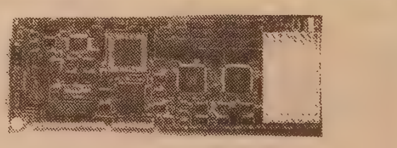

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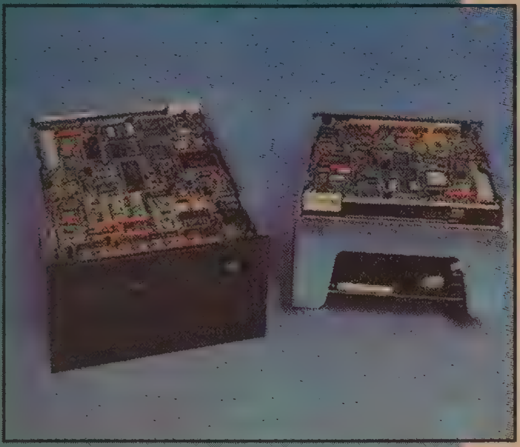

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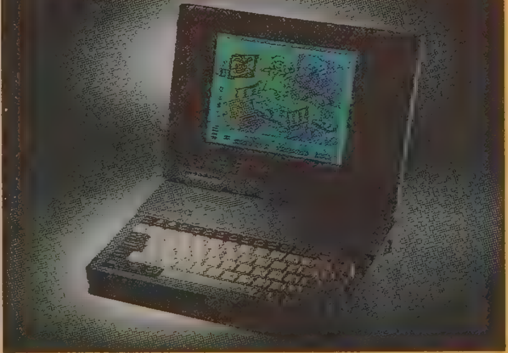

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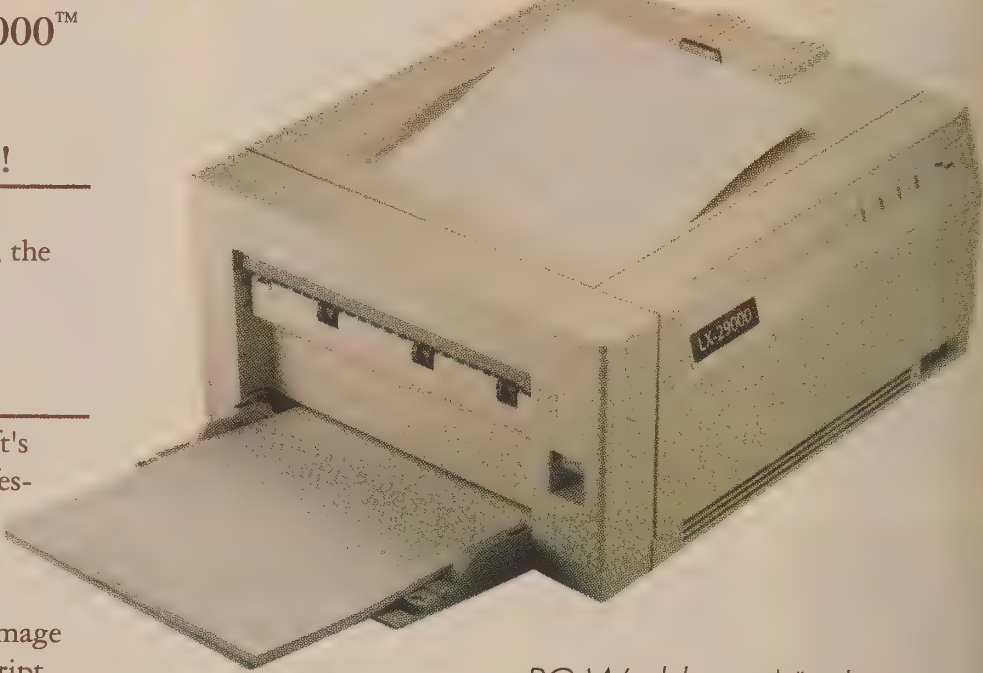

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INDUSTRY INSIGHT

Steve Jackson Wins Judgment Against Secret Service; UNIX Vendors Unite Against Microsoft

BY PAUL HOFFMAN

STEVE JACKSON GAMES CASE: IMPLICATIONS FOR COMPUTER USERS AND BBS OPERATORS

In a widely followed case involving privacy and government seizures, Steve Jackson Games of Austin, TX, won a major lawsuit against the US Secret Service and other government agencies that had raided the game manufacturer, then kept its computers for many months. The game company won more than $50,000 in damages, and its attorneys will be paid by the government.

More important, however, is the exposure that the government's bumbling received. After the raid and publicity that followed, it became obvious that the government agents had no idea what they were doing or how to analyze what they had.

The case began in 1990 when the Secret Service raided the game manufacturer's offices, seizing its computers with a warrant stating that the bulletin board system run on one of SJG's computers had stolen material on it—specifically, the notorious "E911" document, which at the time was considered to be stolen from Bell South and potentially dangerous to the security of the phone system (it later turned out to be both publicly available and innocuous). The only connection to Steve Jackson Games was that a company employee was known to have had possession of the document. Before the raid, the Secret Service did not attempt to find out whether or not the document was even on the system, which they could have ascertained easily.

After the raid, SJG, with the help of the Electronic Frontier Foundation, sued the government on many counts and won on most of them. The most serious charge was that the seizure directly violated the Privacy Protection Act of 1980, which was aimed at preventing the government from harassing publishers. Because SGS was a publisher of both books and games, the raid was clearly illegal. As recorded on videotape, SGS employees told the Secret Service people about the company's status as a publisher under the law during the raid, and complained afterwards, but the raiders claimed not to have known about the law (even though one was a lawyer).

The judge, Sam Sparks of the federal district court in western Texas, ruled that the warrant itself was legal but "simply sloppy and not carefully done." He listed numerous incorrect statements in the warrant, but did not give SJG any damages for the faulty warrant.

The more serious part of the fiasco was that the government knew that by keeping all the computers of SJG, there was a good chance that they could put the company out of business. As the judge put it, "... Agent Foley [of the Secret Service] must have known his seizure of computers, printers, disks, and other materials and his refusal to provide copies represented a risk of substantial harm to Steve Jackson Games, Inc.—under circumstances where he had no reason to believe the corporation or its owner was involved in criminal activity." He concluded that the government's refusal to return the equipment and copies of the hard disks "cannot be justified and unquestionably caused economic damage to the corporation."

The judge was even harsher on the Secret Service for reading private electronic mail on the bulletin board system, then lying about it. "The Secret Service denies that its personnel or its delegates read the private electronic communications stored in the seized materials and specifically allege that this information was reviewed by use of key search words only. Additionally, the Secret Service denies the deletion of any information seized with two exceptions of 'sensitive' or 'illegal' information, the deletion of which was consented to by Steve Jackson. However, the preponderance of the evidence, including common sense, establishes that the Secret Service personnel or its delegates did read all electronic communications seized and did delete certain information and communications in addition to the two documents admitted deleted. The deletions by the Secret Service, other than the two documents consented to by Steve Jackson, were done without consent and cannot be justified."

The larger issues brought up by the seizure have been widely discussed on the nets for

> **The concept that the government could take all the assets of a bulletin board system, put it out of business, and never file charges is indeed scary for computer users.**

Copyright © 1993 by Paul Hoffman. All rights reserved. Paul Hoffman is an industry analyst who has been covering microcomputer technology for ten years. He can be reached on Internet (phoffman @well) or CompuServe (71545,346). He also writes popular microcomputer books.

years. Clearly, the original "bust" was meant to be a warning to hackers; also clearly, it went awry. The concept that the government could take all the assets of a bulletin board system, put it out of business, and never file charges is indeed scary for computer users. One only needs to look at the zeal of the US Drug Enforcement Agency when it gets warrants to see how frightening the prospects could get for computer users. The DEA can seize property and sell it to fund their activities, without even bringing a single charge against the owner. Recently, a Ventura County district attorney said that the DEA was so interested in getting a $5 million ranch that was supposedly used to grow marijuana that they put together a trumped-up warrant and tried to seize the ranch, killing the owner during the raid; no marijuana was found and no charges have been brought. If the Secret Service gets such powers in its raids on supposed computer criminals, all the time claiming to not know the laws, the situation could be just as dire.

While many expected this to be the least likely subject of agreement, the group came up with a neat trick: everyone agreed to support three different networking products.

UNIX VENDORS TRY YET AGAIN TO AGREE ON STANDARDS

It's spring, so the different computer manufacturers who support UNIX must be trying to form another alliance.

There's a much stronger sense of urgency this year due to their previous well-documented failures to form alliances, not to mention a new major threat: Microsoft's Windows NT. The former is simply an embarrassment; the latter could be a real problem, depending on how well Microsoft markets Windows NT to the single-user workstation market.

Even though the announcement was made by the biggest companies in the UNIX business (IBM, Hewlett-Packard, Santa Cruz Operation, SunSoft, Univel, and so on), many people in the industry are skeptical that they can pull off the unification after so many earlier failed attempts. The announcement, made at last month's UniForum convention, said that the companies would work together to define a specification for a "common open software environment across their UNIX system platforms." Of course, that's what the same companies have been trying to do for years.

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Basically, the companies agreed to a common desktop environment, graphics, object handling, multimedia, network protocol, and network management. As expected, the new standard will be a hodge-podge of existing software from different companies, with a few novel twists that might help the standard get off the ground. The expected standards will include:

•Desktop environment: The standard will be based on the X Window version 11 software. It will incorporate parts of Hewlett-Packard's popular Visual User Environment (VUE), IBM's much-maligned Common User Access (CUA) model, OSF's Motif, and SunSoft's Open Look. The resulting mess will be foisted on developers later this year. By choosing one of each, the new consortium is assuring that no major programs will run under the new system for at least six months (and more likely a year) from the time that the standard is finalized, due to the significant amount of programming involved in meeting all the new interface changes.

•Graphics: As mentioned above, the companies agreed to use X Windows. This came as a boon for almost everyone except Sun, who is having to phase out most of Open Look.

•Object handling: Due to Microsoft's finally setting a minimal object handling standard for Windows NT, the consortium agreed that there had to be a common object handler in the new UNIX. They say that they will support the Common Object Request Broker (COBRA) standard developed by the industry-wide Object Management Group (OMG). COBRA is not finished, and the companies in the consortium will probably want to each put in their own two cents' worth on how it should work. Unfortunately, this means that object handling won't be fully supported for at least two years.

•Multimedia: Everybody's favorite buzzword gets its due in the new UNIX. Although the tools needed for such a specification are available now, expect this to also be a political morass that will end up with a messy programmer's interface.

•Network protocol: While many expected this to be the least likely subject of agreement, the group came up with a neat trick: everyone agreed to support three different networking products. Thanks to the tremendous amount of work done on making internetworking a reality, it is not that difficult to support connections to more than one type of network. Thus, all members agreed to "sell, deliver, and support OSF's DCE, SunSoft's ONC+ and Novell/Univel's NetWare UNIX client networking products." In short, they agree to support their favorite standard best, but agree to meet the common client demands to support other company's network products as well. If this scheme works, it may ease the problems of network administrators everywhere; if not, it will certainly spell the doom of the consortium.

•Network management: The companies agreed to agree to a common network management suite. No one seriously believes that this will happen any time soon.

In the meantime, Microsoft is moving ahead with the much delayed Windows NT. It has sent out another general release beta test, although it is still missing some significant components.

Microsoft may be able to steal some of the UNIX market away from the workstation companies if it can deliver even a reasonable product that works well and runs Windows 3.1 programs by the end of this year. If Windows NT is optimized for Intel's forthcoming Pentium processor (or even if a few of the critical code segments are optimized), Microsoft may be able to get more attention for its product than the UNIX marketers can for theirs.■

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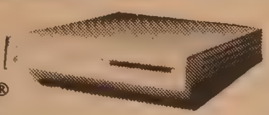

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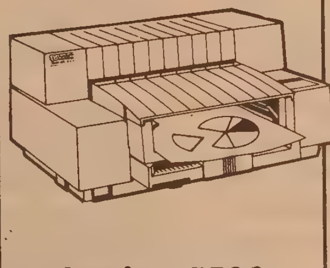

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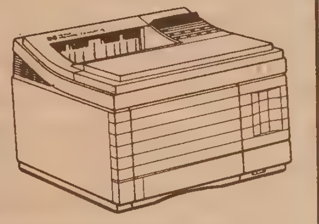

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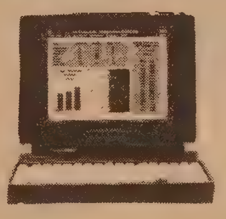

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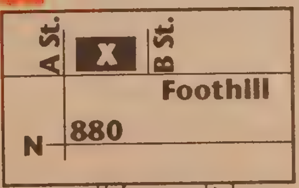

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MICROTIMES INDEX HITS ANOTHER RECORD HIGH

Fueled by renewed hopes that the latest economic rebound will be sustained, investors were net buyers of computer stocks during the month of March.

When the books were closed on the monthly trading session, here is how our industry fared: the *MicroTimes* Stock Index upticked 69.1 points, or 2.67%, to close at 4196.89—its highest level ever. In fact, the Staffing Index was the best performing indicator of all the indices in the accompanying charts. The Dow Jones Industrial Average, in comparison, rallied 1.19% last month to close at 3439.44, but not before hitting a new record high of 3478.34.

Symantec's stock swelled 37.2% and was our portfolio's largest percentage-gainer. Last month, SoundView Financial Group raised its investment rating for the technology concern to "long-term buy" from "hold." The brokerage firm cited optimism about improved earnings momentum and new products for the ratings upgrade. Separately, Symantec announced that it has expanded its line of network and communications software products with The Norton pcANYWHERE version 1.0 for Windows. Shares of Symantec closed at $13.38.

In Canada, things were not nearly as rosy for Northern Telecom. The reason: the company said first-quarter earnings won't meet Wall Street's forecasts of about 47 cents a share. The earnings shortfall is due to increased spending on research and development, increased costs associated with international ventures, lower prices for the company's central office switching products in North America, and lower software revenues. The result: Northern Telecom's stock dropped $7.25 a share, or 16.5%, to $36.75. Northern Telecom was the largest dollar and percentage casualty of the lot last month.

IBM lost ground, as that concern dropped $3, or 5.5%, to close at $51.88. Last month, Merrill Lynch reduced its '93 estimated earnings for the company. Merrill Lynch had forecast $1.00 to $1.50 per share in '93, but the estimates were reduced to $.50 to $1.00 per share for the fiscal year.

Novell rallied 9.9% to close at $32. Last month, Alex Brown & Sons, Smith Barney, Oppenheimer, Dean Witter and First Boston all made positive comments on the future earnings growth of the networking concern. Separately, Novell and Digital Equipment Corp. announced an agreement to jointly develop, market, and support NetWare on Digital's fastest, RISC-based platform currently available. The partnership will make it possible for customers to realize increased performance of network services and applications on the NetWare environment. ■

EXCH	COMPANY		TICKER SYMBOL	CLOSING PRICE 03/04/93	CLOSING PRICE 04/01/93	NET CHANGE IN MONTH	PERCENT CHANGE IN MONTH	P/E RATIO	ANNUAL DIVIDEND RATE	ANNUAL DIVIDEND YIELD	ANNUAL HIGH	ANNUAL LOW
	SOFTWARE											
OTC	Adobe		ADBE	44.00	42.50	–1.50	–3.41	21	0.40	0.94	54.25	25.25
OTC	Aldus		ALDC	19.00	18.75	–0.25	–1.32	41	0.00	0.00	24.50	10.25
OTC	Autodesk		ACAD	45.50	43.63	–1.88	–4.12	25	0.48	1.10	56.50	27.75
OTC	Borland		BORL	21.50	21.25	–0.25	–1.16	–	0.00	0.00	55.25	17.50
OTC	Informix		IFMX	34.50	33.50	–1.00	–2.90	20	0.00	0.00	42.00	12.13
OTC	Lotus		LOTS	26.13	25.63	–0.50	–1.91	14	0.00	0.00	35.50	14.75
OTC	Microsoft		MSFT	83.75	93.00	9.25	11.04	33	0.00	0.00	95.00	65.50
OTC	Novell	(H)	NOVL	29.13	32.00	2.88	9.87	36	0.00	0.00	35.25	22.50
OTC	Oracle	(H)	ORCL	33.25	36.88	3.63	10.90	53	0.00	0.00	37.50	12.00
OTC	Software Publishing		SPCO	13.13	13.75	0.63	4.76	–	0.00	0.00	20.25	6.75
OTC	Symantec		SYMC	9.75	13.38	3.63	37.18	–	0.00	0.00	47.50	5.88
	HARDWARE											
OTC	Apple		AAPL	55.00	51.75	–3.25	–5.91	12	0.48	0.93	65.25	41.50
OTC	AST Research		ASTA	14.50	13.75	–0.75	–5.17	8	0.00	0.00	24.25	11.25
NYS	Commodore	(L)	CBU	5.38	5.00	–0.38	–6.98	–	0.00	0.00	14.63	4.75
NYS	Compaq		CPQ	45.00	50.00	5.00	11.11	19	0.00	0.00	58.50	22.25
NYS	Digital Equipment		DEC	46.25	43.75	–2.50	–5.41	–	0.00	0.00	54.88	30.38
OTC	Dell		DELL	30.25	35.00	4.75	15.70	14	0.00	0.00	49.88	15.00
NYS	Hewlett–Packard		HWP	75.88	75.63	–0.25	–0.33	23	0.80	1.06	82.88	50.25
NYS	IBM		IBM	54.88	51.88	–3.00	–5.47	–	2.16	4.16	100.38	45.88
NYS	Silicon Graphics		SGI	28.88	27.63	–1.25	–4.33	–	0.00	0.00	33.00	14.13
OTC	Sun Microsystems		SUNW	34.88	30.00	–4.88	–13.98	22	0.00	0.00	41.00	22.50
NYS	Xerox		XRX	83.00	83.13	0.13	0.15	–	3.00	3.61	88.88	66.75
NYS	Tandy		TAN	25.75	30.13	4.38	16.99	14	0.60	1.99	32.13	22.25
	CPU'S											
NYS	Advanced Micro Devices	(H)	AMD	22.63	22.63	0.00	0.00	9	0.00	0.00	24.50	7.38
OTC	Intel	(H)	INTC	118.63	111.50	–7.13	–6.01	23	0.40	0.36	121.25	46.50
NYS	LSI Logic	(H)	LSI	11.75	12.25	0.50	4.26	–	0.00	0.00	14.13	4.88
NYS	Motorola	(H)	MOT	59.38	65.13	5.75	9.68	30	0.44	0.68	67.13	36.44
	COMMUNICATIONS											
NYS	AT&T	(H)	T	57.25	57.00	–0.25	–0.44	20	1.32	2.32	59.13	40.13
NYS	BellSouth Corp.	(H)	BLS	57.13	56.00	–1.13	–1.97	17	2.76	4.93	57.50	43.38
OTC	MCI	(H)	MCIC	41.50	44.88	3.38	8.13	20	0.10	0.22	46.00	29.50
NYS	Northern Telecom		NT	44.00	36.75	–7.25	–16.48	17	0.36	0.98	48.00	30.50
NYS	Pacific Telesis	(H)	PAC	47.25	47.75	0.50	1.06	17	2.16	4.52	49.38	36.88

KEY: NYS = NEW YORK ASE = AMERICAN OTC = OVER THE COUNTER
(H) = NEW HIGH REACHED IN PERIOD (L) = NEW LOW REACHED IN PERIOD

MARKET DIARY:

ADVANCES	13
DECLINES	18
UNCHANGED	1
NEW HIGHS	10
NEW LOWS	1

MOST ACTIVE ISSUES:

LARGEST DOLLAR GAINER	Microsoft	$	9.25
LARGEST DOLLAR LOSER	Northern Telecom	$	–7.25
LARGEST PERCENTAGE GAINER	Symantec		37.18 %
LARGEST PERCENTAGE LOSER	Northern Telecom		–16.48 %

	CLOSE 03/04/93	CLOSE 04/01/93	NET CHANGE IN MONTH	PERCENT CHANGE IN MONTH
MICROTIMES STOCK INDEX	4127.80	4196.89	69.10	1.67
DOW JONES INDUSTRIAL AVERAGE	3398.91	3439.44	40.53	1.19
STANDARD & POOR'S 500 STOCK INDE	447.34	450.30	2.96	0.66
N.Y.S.E. COMPOSITE	246.53	248.74	2.21	0.90
NASDAQ COMPOSITE	680.73	686.64	5.91	0.87

CLOSING QUOTES FOR GRAPH:

DATE	MICRO TIMES	DOW JONES
08/28/92	3198.48	3267.61
09/25/92	3313.28	3250.32
10/23/92	3536.03	3207.64
12/10/92	3825.83	3312.19
01/11/93	4020.09	3262.75
02/05/93	4083.40	3442.14
03/04/93	4127.80	3398.91
04/01/93	4196.89	3439.44

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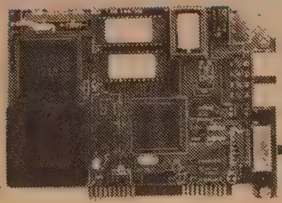

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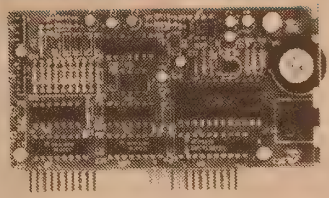

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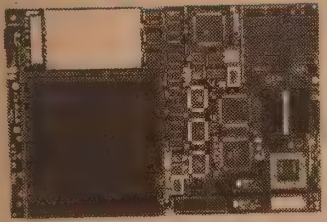

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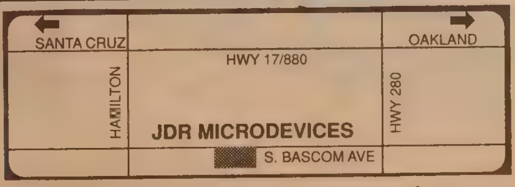

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486-50 ISA W/64K	539	699	901	1139	1204	1279
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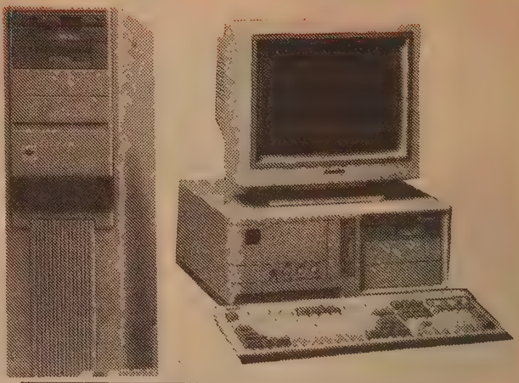
386SX-33	88	248	450	688	753	828
386SX-25	83	243	445	683	748	823



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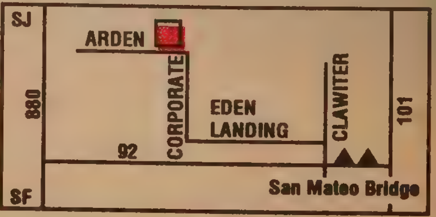

Modem Access To Legislation; Computer-Literate Justice

We Can Help Shape The Future— Or We Can Just Watch As Others Do It To Us.

BY JIM WARREN

REALIZABLE FANTASIES

LEGISLATION FOR DIALUP ACCESS TO LEGISLATIVE PROCESS

On March 4th, a bill was introduced in Sacramento that would require virtually all California state legislative information to be available to the public by modem.

It explicitly includes complete text of each bill and each amendment, bill history, bill status, veto messages, agendas, legislative schedules, Senate and Assembly daily files, etc. It states, "The State Library shall establish a system whereby the information [listed here, plus much more] is available to the public by means of access through a computer modem."

This would permit *timely* access to complete legislative information—*essential* for effective citizen involvement. It would *begin* to make California's governmental information as accessible to California residents as Hawaii's has been for several years to Hawaii residents.

For the first time—at little or no cost—citizens, community groups, activist organizations, unions, newspaper reporters, editorial writers, cities, towns, counties, schools, and all other individuals and groups in [and beyond] the state could know most of what is happening in the Legislature almost as fast as onsite lobbyists.

But—this is going to be an uphill battle and will require aggressive public support.

- The Legislature currently sells its comprehensively computerized legislative records and bills-in-progress in electronic form to high-profit, high-priced information distributors for hundreds of thousands of dollars per year.
- Big-bucks lobbyists can afford access, but cost shuts out "mere" citizens and many others. And *some* lobbyists would much prefer to keep it that way.
- Information distributors—especially current contractors such as LegiTech, StateNet and Mead Data Central—seem certain to channel significant loot to those legislators who are willing to skewer low-cost citizen access to their legislature. And one or two of those information distributors are owned by powerful publishers.
- Any requirement for new funding will almost certainly kill the bill. But, there are numerous ways the State Library could implement it at little or no cost to the Library or the state.

Downloads could be cracker-safe, output-only, off-hours, daily feeds to several library and/or nonprofit and/or academic networked computers, each committing to allow free dial-up by still other host computers—as is the custom among thousands of Internet hosts currently. The US Supreme Court decisions are immediately available, globally, via this mechanism. If the Legislature won't allocate extra funds, the minimal necessary equipment could be donated by computer corporations; private-sector and nonprofit funding could pay operational costs, if they couldn't be provided by *pro bono* volunteers.

The bill (AB 1624) was introduced by Assembly Member Debra Bowen, State Capitol #3126, Sacramento, CA 95814; voice phone (916)445-8528. Supporters must be vocal and vehement.

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GOVERNMENT DATA DIDDLING UNNEEDED

The Legislative Data Center and the State Library do not *need* to do *any* processing of the data, except take the specified legislative information in whatever form it's used internally and download it to some open-access systems. Once the data is publicly available in machine-readable form, all sorts of nonprofit groups and for-profit entrepreneurs can process it—index, cross-reference, summarize, publish it, and otherwise make *timely* use of it, limited only by their imaginations and resources.

The high-priced distributors would probably continue to pay for their current (elite) access. Or they could download data from the primary open-access systems—just as though they weren't more important than the mere voters and citizens of the state. They could certainly continue to provide convenience and value-added services to their high-paying clients. The only thing they—and their clients—would lose would be functional monopoly over effective public access to these invaluable public assets.

SUPREMES' NEW SINGER COULD PROTECT ELECTRONIC CIVLIB

More and more explorers and settlers in "cyberspace" are expressing increasing concern about protecting the principles reflected in our 200-year-old Constitution against encroachments justified by government on the basis of new technologies. That is:

- Protecting electronic distribution of information and opinion just as print press in newspapers and magazines is protected.
- Protecting network-based personal expression just as voice speech in Hyde Park is protected.
- Protecting private electronic discussions from the chilling effect of systematic, automated electronic surveillance just as face-to-face assembly is protected.
- Protecting electronic mail from bulk seizure and search, just as paper mail in a post office is protected from office-wide search or seizure.

And much more.

The Prez will shortly choose his first nominee for the US Supreme Court. At least one, and perhaps two openings on the High Court will occur within a year. There is already an administration team reviewing candidates. It's likely that Clinton will name his first nominee before summer. Recently, a number of "short-lists" of his most likely choices have been widely publicized.

Only one person named in almost all of those short lists has prominently demonstrated knowledge of, and concern about, technological threats to constitutional principles—Harvard Law Professor

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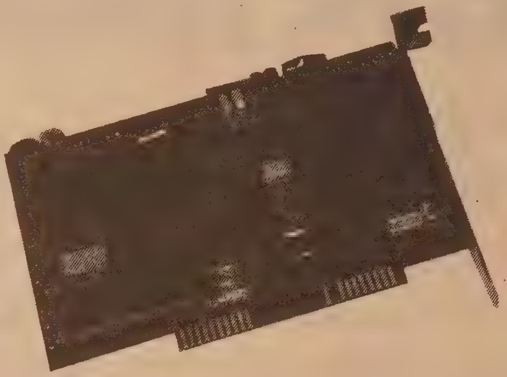

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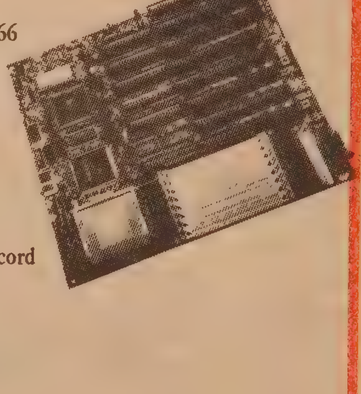

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Laurence Tribe. He is widely reputed as perhaps the leading constitutional scholar in the nation. His texts are standards for law school courses in Con Law. He is so highly reputed that he has even served as a consultant to some of the new nations formed from the old Soviet Union as they draft their national constitutions.

In March, 1991—for the first time in his professional career as a constitutional scholar —Professor Tribe felt an issue was so important that he proposed an Amendment to the US Constitution:

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THE HORSE'S MOUTH

I often speak on technology, government, freedom, and privacy, and also about personal computing's history and futures. On April 27th, the Electronic Frontier Foundation's Washington counsel, Shari Steele, and I will present a half-day seminar for the High Tech Criminal Investigators Association (HTCIA). On May 27th, I'll join Terry Winograd and Denny Brown in discussing "The Future of Computing and Its Impacts on Society" before Silicon Valley's Churchill Club. June 18th, I'll be the banquet speaker for the Ohio Libertarian State Convention. ■

Warren founded InfoWorld, Wireless Digital, Initiative, Inc., and one of the nation's largest public microcomputer conventions. He was founding host of PBS's Computer Chronicles, *founding editor of Dr. Dobb's Journal, and has chaired various trade and professionals' organizations. He holds graduate degrees in computing (Stanford), medical information science (UC Medical Center), and mathematics & statistics. He has been a computer professional since 1968, and was a mathematics teacher and professor for ten years before that.*

He organized and chaired the landmark First Conference on Computers, Freedom & Privacy (1991), sponsored by a dozen nonprofit civic, professional, and industry organizations, and received one of the first Electronic Frontier Foundation Pioneer Awards (1992). He is a member of the board of directors of Autodesk, Inc., and also chairs the Communications Committee of the California Public Records Act Reform Coalition.

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I am HIV positive and have severe ARC disabilities, and do not have the strength to do all this in writing, so I depend on the computer to do all my letters and correspondence with. I also do bookkeeping to earn some extra cash since I am on a low income, $600 a month, that does not allow for any extra money for repairs of the system that I now have. I am looking for a kind person who would be willing to help in my time of need. I have most of the software and one of the companies is sending me (free) their latest release (Peachtree), but without a sound machine to run them on, what is the sense of loading it again and again?

I am including my phone number and can be reached most days since I am almost homebound these days. I really hope that someone comes forward with a kind heart and is willing to help (I pray every night for this) and I hear something good back from this.

Cliff Wilson
Hayward

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(We received this letter after Red Cloud requested a free classified ad in our Southern California edition. We thought their work was sufficiently important to bring it to the attention of a larger audience. If you can help with donated equipment or in some other way, contact Red Cloud at 714/833-3865.—Eds.)

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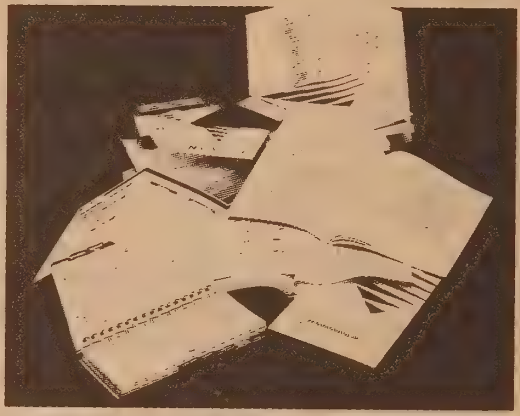
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Casio Challenges Wizard With SF-R20

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The Casio B.O.S.S. series of personal organizers has always been the poor cousin to the more successful, and typically better-designed, Sharp Wizards; generally been less expensive than the Wizards, but you got what you paid for (or maybe slightly less). The keyboards were poor (paradoxically, Casio once released an "upgrade" to an older B.O.S.S. series, but the "upgrade" included changing from real keys to a flat-panel keyboard); the user-interface was clunky; and the overall appearance was cheap and flimsy compared to the slick design of the Sharp Wizards and organizers. However, with the SF-R20, Casio seems determined to cut into Sharp's market share with a radical redesign.

And I must say that they have done a very good job, succeeding in almost every way in their attempt to improve upon the earlier machines. With only a few design flaws to speak of, the SF-R20, available for around $300 in your local consumer electronics stores, is an entirely different machine from the earlier B.O.S.S. organizers, a tremendous improvement over them and certainly strong competition for the Sharp Wizard line. The SF-R20 features a new exterior design, much more rugged construction, a large screen capable of displaying ten forty-character lines, a QWERTY keyboard (with real, though small, keys), and a much cleaner user interface, including extensive context-sensitive help.

The 256K-RAM SF-R20 comes with a variety of standard organizer functions (address book, memo pad, calculator, calendar/scheduler, clock, and world time), as well as a to-do list, a business card function, an anniversary function, and a "free file" function, used for storing free-form database information.

Most interestingly, it includes a full-function spreadsheet (Lucid 3D), complete with simple macro capabilities (but no graphing). The Lucid spreadsheet will convert Lotus 1-2-3 spreadsheets (up to 32K) into its internal format. This makes the SF-R20 not only a full-function organizer but also a powerful general-purpose financial calculator (among other things).

> **With the SF-R20, Casio seems determined to cut into Sharp's market share with a radical redesign. They have done a very good job, succeeding in almost every way in their attempt to improve upon the earlier machines.**

The unit measures 7 1/8" x 3 7/8" x 7/8 ", making it almost identical in size and shape to the Sharp Wizard OZ-8000 series. The SF-R20's exterior case is sleek and attractive, unlike previous Casio palmtops, and features a particularly rugged hinge mechanism which is apparently intended to reduce problems with the display-keyboard connection during extensive use (this occasionally occurs with the Sharp Wizard series).

Unlike previous Casio B.O.S.S. machines, this one is relatively intuitive to use. Whenever there are difficulties, you can always hit the HELP button, which gives in most cases very clear context-sensitive help. You can get immediate feedback without having to dig out the manual.

One minor confusion has to do with the profusion of different "enter" keys; unlike the Wizard, which has two (a carriage return key and an "enter" key which is used to finish a data entry), the Casio has three (a carriage return key, a "next" key, and a "set" key), and it's not always clear which one is required in the given situation. However, when one doesn't work, you can always try another, and after a while you get the hang of which key is used in which situation.

The keyboard is small, of course, but quite usable, with one exception: instead of using a standard SHIFT key, you have to toggle the shift mode on by hitting SHIFT, then the character you want capitalized. This design is left over from the bad old days; the original Sharp Wizards also had this problem, though the newer Wizards have "normal" shift keys (you hold down the shift key to capitalize the letters as you type). The Casio's flaw is not as bad as it sounds, however, because after you hit the shift key, it will only capitalize the next character you type, automatically returning to lower-case mode after that next key has been pressed.

The display is large and readable; the big-character mode can be read at a considerable

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distance. One minor gripe: the contrast control dial is located in a particularly easy-to-reach place, so I've often accidentally hit that dial without noticing it; the screen goes blank, so I think the machine is off when it isn't. Hitting the "on" button, of course, does no good, since the unit is already on. I went though a few moments of panic the first time this happened before realizing that the screen was blanked out due to the contrast control.

The searching functions are generally powerful and convenient. Different searching techniques range from searching only in the current mode to searching all modes for a given data item. You can easily search for a given string in the Memo pad, for example, just by typing the string and hitting one of the search keys. This is similar to the Wizard design. However, in addition, you can do global searches, and the "search" key is more easy to use and obvious than on the Wizard.

The Lucid spreadsheet will convert Lotus 1-2-3 spreadsheets (up to 32K) into its internal format. This makes the SF-R20 not only a full-function organizer but also a powerful general-purpose financial calculator

The spreadsheet comes with a number of "templates", or pre-built spreadsheets, designed to do a variety of common computational tasks for you. These include such useful items as an amortization template, a house payment estimator, and a checkbook template, among others. The templates are described in brief in the on-line help, or at greater length in the manual.

Because the SF-R20 is an organizer and contains programs specifically designed for low RAM usage, the 256K is used more effectively than in units such as the HP 95LX or the Psion Organizer 3. Only 56K or so is used by the machine as "overhead" while the unit is in operation; this leaves a full 200K of the 256K available for the storage of spreadsheets, telephone book entries, memos, and other information. Even though the unit includes a spreadsheet, normally a memory-hungry application, it uses only the 56K "overhead" memory, leaving the 200K RAM storage area for user data and spreadsheets. For example, rather than "loading" the spreadsheet into working RAM, the machine can simply work on the spreadsheet "in place"; this reduces the need for extra RAM as well, since a separate "RAM disk" and working RAM area need not exist (resulting in needless duplication of RAM usage). This points out one of the advantages that specially-built organizers have over DOS-compatible palmtops.

There are some problems with this machine. One weakness of the B.O.S.S. series as a whole, the SF-R20 included, is the relative dearth of software cards. The Sharp Wizard has a large variety of cards available; the B.O.S.S., by contrast, has comparatively few. What I particularly miss is a terminal emulator program; I've sometimes been on vacation and used my little Wizard as a portable terminal to check up on my email without having to drag around a full-blown laptop. Not only does the B.O.S.S. fail to include a built-in terminal program, there is none available on an optional IC card. (There exists, however, an optional PC or Mac link cable and software—which I think should be bundled with organizers these days, as they are absolutely necessary—which go for about $100 each, and allow data to be transferred to and from a PC.)

Another feature I'd liked to have seen is some sort of macro feature; the Wizards have a "user dictionary" that allows you to put in commonly-used keystrokes. Though the spreadsheet function has macro capabilities, the machine as a whole does not (as far as I can tell).

However, these problems are relatively minor (unless you happen to require one of the missing capabilities, such as terminal emulation). If you're looking for a powerful general-purpose palmtop with spreadsheet functionality, the SF-R20 is an inexpensive and versatile tool. Much cheaper than the HP 95LX or similar machines, it nevertheless approaches its usefulness and power, and aside from its lack of a good built-in terminal program, it has all the features you would want in a good portable personal information manager.

THE CASIO/TANDY ZOOMER

The hot news in the palmtop industry these days is the announcement of the Casio/Tandy collaboration on a pen-based palmtop machine code named the Zoomer. The technology is apparently positioned to compete with the Apple Newton, providing pen-based palmtop functionality using a GeoWorks-based operating system.

In addition, Palm Computing, America Online, and Intuit have also joined the team to provide software and connectivity solutions. Palm Computing develops palmtop-based application software; America Online provides online services to consumers, and Intuit is the maker of the popular Quicken personal financial software package. Unfortunately, few details were available about the machine at the announcement; no information about projected price point, specifications, or even size and weight were available at press time. However, the promotional photograph makes the unit look roughly the size and shape of the handheld version of the Apple Newton, clearly establishing the Zoomer's target competitor.

POQET RISES AGAIN

Remember the old Poqet (pronounced "pocket") PC? No?

Well, the Poqet PC was one of the first DOS-compatible palmtops on the market; it made a big splash when it was first introduced, but had difficulty gaining market acceptance due to its lack of built-in functionality and its reputation for being difficult to use. Fujitsu Personal Systems bought Poqet, and renamed it Fujitsu Personal Systems. Fujitsu recently introduced two new machines: the PoqetPad Plus and the Poqet PC Plus.

The PoqetPad Plus is a handheld, full-sized screen pen-based DOS-compatible palmtop intel inside

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that features an 8086 compatible V30 processor operating at 16MHz, 2 MB of RAM, and two PCMCIA slots (a type I/II slot and a type I/II/III slot). The unit weighs in at 1.6 lbs., measures 10" x 4.6" x 1.5", and will operate three to twelve hours on a rechargeable NiCad battery pack. The long battery life and light weight are due to an advanced power management technology developed by Fujitsu Personal Systems. The machine also comes with an RS-323C infrared link, an RS-232 serial port, TTL serial (for bar code wand support), and a keyboard port. The target retail price is $1550.

The Poqet PC Plus also weighs 1.5lbs., measures 9.1" x 5.1" x 1.4", and also operates for three to twelve hours on a charged NiCad battery pack. The unit includes a keyboard, and has two PCMCIA slots (both type I/II). The machine is priced at $1120 retail.

A DIFFERENT KIND OF PCMCIA MODEM

New Media Corporation has announced a PCMCIA fax modem with two twists: one, it's compatible with the HP 95LX (which has only a PCMCIA 1.0 slot, and thus is not compatible with most of the recent rash of PCMCIA 2.0 fax modems that have been announced), but it also comes bundled with software. For a list price of $259 the PalmModem 2400 comes with a terminal emulation program as well as fax software. This makes it considerably easier to just plug and play: rather than requiring the user to download floppy-disk based software, the software is bundled in ROM on the card itself. In addition, for an additional $80, the personal information manager ACT! is bundled as well (also on the card), adding address book, scheduling, word processing, and report generation capabilities.

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Trantor Systems, Limited, has announced a remarkable PCMCIA-to-SCSI adapter which will allow PCMCIA-based palmtops and laptops to connect easily to SCSI devices. The SlimSCSI is a high-performance 16-bit SCSI adapter that plugs into your PCMCIA Type II slot, and allows access to magneto-optical, Floptical, SyQuest, Bernoulli, external hard disk drives, CD-ROMs, HP ScanJet scanners, and SCSI tape drives right from your palmtop (using Trantor's provided SCSI application software). The interface provides up to 2MB/second data transfer rates, which is comparable to many PC-based ISA SCSI adapters. This dramatically increases the general connectivity capabilities of a palmtop; on the road, you can use the internal RAM, and when you bring it home, you can hook it to an external SCSI hard disk or tape drive.

AND MORE PCMCIA NEWS

Data I/O has announced the PC Card Drive, a parallel port-based PCMCIA card drive that allows PCs to read PCMCIA memory cards as though they were hard disks attached to the computer. The CardPro will use the Microsoft Flash File System 2 as its standard filesystem for storing information on the card, and the drive will support both PCMCIA Type I and Type II memory cards. The suggested retail price will be $450. ■

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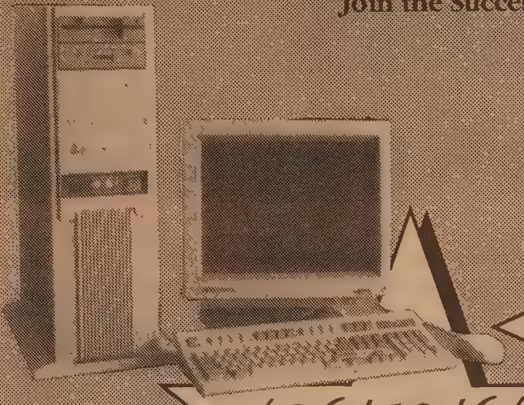

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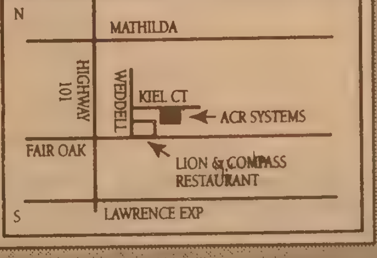

Faxmodem Power For Windows Users

Eclipse 1.21 Adds OCR And Other Enhancements

BY WOODY LISWOOD

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If you use a faxmodem, run Windows, and are frowning about the declawed fax software which accompanied your faxmodem, Eclipse Fax will get that smile back on your face.

On the surface, Eclipse is like other products—it sends and receives faxes. With version 1.21, Eclipse also added OCR.

Below the surface is a great complexity. Eclipse lets you modify those faxes you send or receive. You can place lines, graphics, boxes, and arrows—even type text directly on a fax. Eclipse also lets you fax to a file, keep a store of boilerplate faxes, and then assemble them for transmission with just a few mouse clicks.

If you receive volumes of faxes, all of which you feel you have to keep forever on that extra-large hard disk, Eclipse compiles and indexes them for storage and easy retrieval.

Eclipse works with send-only faxmodems, send and receive faxmodems, and CAS specific faxmodems.

WORKING WITH ECLIPSE

Installation is Windows standard. Run SETUP from the FILE MENU.

Adjusting Eclipse to your needs is a snap, with everything done on a single screen. Here is where you will first notice the sophistication which puts Eclipse ahead of the competition. Instead of a single Name and Station identifier, for example, you can enter as many as you wish. This means that you can easily configure your fax to additional configurations by just entering Setup and selecting new names, IDs, paper sizes, and the like from a Windows standard scroll-down menu.

I use my faxmodem for *MicroTimes* correspondence, my Human Resource Consulting practice, and to fax messages as Director of Human Resources for Monarch Ski Resort. With just a couple of clicks, I can change my company and station ID as appropriate. (You do, however, have to go back to the main setup screen to change your sending ID. It would be much easier if Eclipse had the Send ID as part of the same selection procedure it uses for selection from your phone book.)

Like all the other fax products, Eclipse installs as a printer for sending faxes from Windows. If you want to receive faxes, however, you must run the Eclipse fax manager program. To do this, you must add a LOAD=E-FAXMGR.EXE to your WIN.INI file or run it from an ICON whenever you want it active.

When you select Eclipse to send a fax, a large dialog box opens, from which you can select the name and company you want to send to, or create a new phone book entry. Additionally, if you have prepared graphic letterheads or second sheets, you can have Eclipse add these graphics to your fax as it is being prepared for sending. Also, at this stage, you can fax to a file, preview the file as it will look as a fax—even mark up the fax with those arrows and boxes, place additional images around the fax, and append additional pages or faxes to the one you are planning to send.

One feature I particularly like is the small optional information window which appears at the bottom of the screen during transmission. It keeps you informed during the process of sending the fax. Without that dialog box, it's hard to troubleshoot problems such as faulty phone lines. A Send Log also keeps track of each fax sent and allows you to view or print it, as well as send it to others or reschedule a transmission if it did not go through originally. Since sent faxes take up disk space, you will need to remember to visit your Send Log and delete your successful sends.

Receiving faxes is automatic. Start up Eclipse and click a few dialog buttons. I set Eclipse to notify me when it receives a fax, and to receive automatically. I turned off print on reception. Going into the Receive Log lets you view, print, or delete your received faxes.

One advantage of computer-controlled faxes is the ability to group faxes and send them late at night when phone rates are cheaper, and to send the same fax to a designated group. Eclipse does both with just a few clicks.

A feature I found interesting is Eclipse's ability to take all of your received faxes and merge them into a single document. Then you can actually assemble single pages from these documents to create a new fax. I found this handy in collecting drafts of some employment contracts I was writing. I added each received contract, with legal changes and new negotiation suggestions, to a single master document. This way, I always have a history of everything associated with a single document.

Eclipse also comes with a DOS TSR, so that it can receive faxes even if you are working in DOS. This is great. What's even better is that you don't have to load the DOS TSR at all if you're working under Windows, as you must with many other products.

Printing faxes is frequently a nuisance, but Eclipse gives you a wide range of handling options. Not only can you view the received faxes, as you can with all other fax programs, you can also have Eclipse take a multipage fax and create a "thumbnail" set of images on your screen for easy previewing, and print the thumbnail if you wish. Eclipse also lets you print only a single paragraph or portion of a fax page, if that's all you need.

SCANNING AND OCR

Eclipse also supports a few scanners, so you can scan in a piece of paper as if you had a normal fax machine. At this point, you can scan to a fax file, or scan directly to the printer. Once you've scanned to a file, then processed it with the OCR, you can add text to the resulting file with a minimum of effort.

The OCR functions are simple to use. After you receive a fax, or scan a document into a file, select OCR from the menu system and let Eclipse work on the file. When it is done, it becomes a notepad file which you can then import into your favorite word processor. I tried the OCR functions on a variety of faxes, some of which contained major graphic elements. The OCR sometimes got confused by the graphics and put some odd characters into the notepad file, but it always seemed to recognize the text elements and convert them properly.

RECOMMENDATIONS, POSSIBLE PROBLEMS

I could find no problems with this software—it's designed the way I think a fax product should be, and has the features and complexity I need in my business. Eclipse has bumped all other fax products from my disk.

The documentation mentions that because of the way 1-2-3 for Windows manages memory, you will have problems faxing to a file when in 1-2-3W. Nonetheless, in three different attempts to fax from 1-2-3W I had no problems. ■

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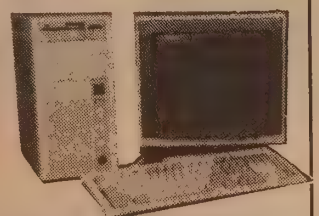

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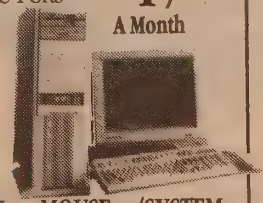

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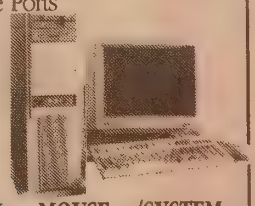

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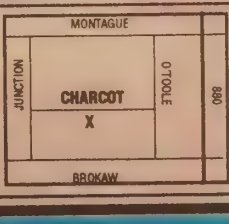

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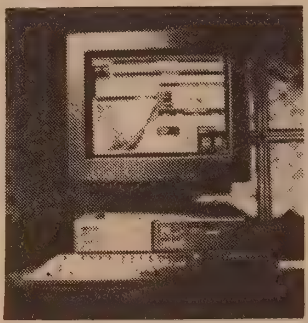

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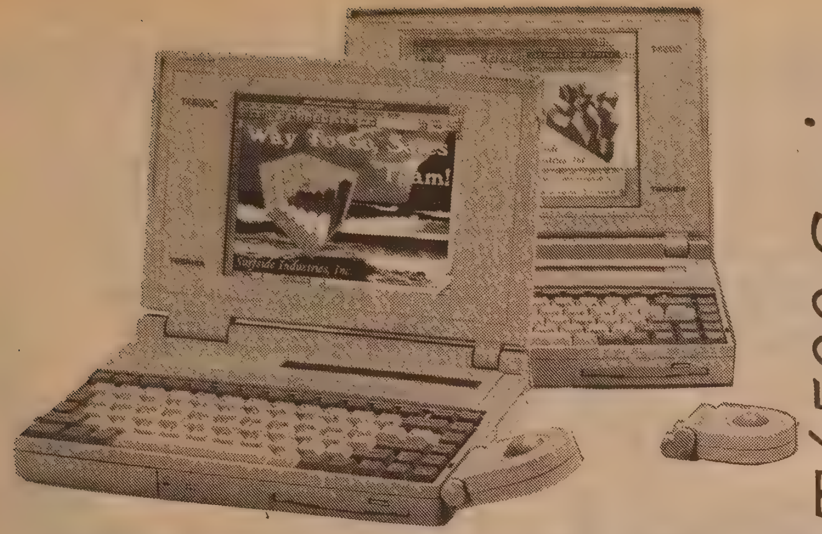

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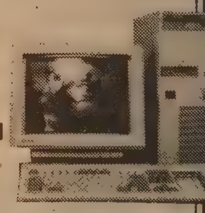

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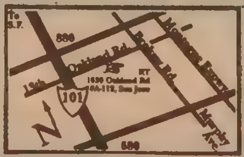

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Memory Cards, File Transfers & Some Guesses

BY ED KAHN

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Corvallis, OR 97330
1-800-443-1254

LapLink V, $169.95
Traveling Software Corp.
18702 N. Creek Pkwy.
Bothell, WA 98011
1-800-343-8080

SDP Storage Card, $599
Sundisk Corp.
3230 Jay St.
Santa Clara, CA 95054
1-800-688-7177

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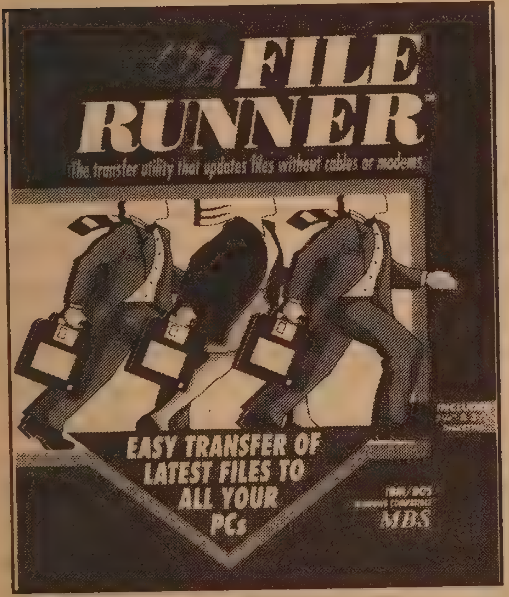
Over the last few months, I have been raving about the possibilities and realities of PCMCIA, the standard that now makes it possible for vendors across company lines to make cards that will work with any computer that is equipped with a PCMCIA slot. As time moves on, it is becoming increasingly clear that more and more computers—especially the portables—will have these slots.

We are now beginning to see the fruits of these raves. Sundisk has just released the SDP Storage Card, a memory card that fits into the PCMCIA slot of a Hewlett-Packard 95LX palmtop computer. I have long praised the 95LX as the best of its class. It comes with lots of memory—up to 1024K—and includes many sophisticated applications such as Lotus 1-2-3. But still, despite all that the 95LX does, it is limited by the lack of a hard disk. Sundisk's card, coming in either 5MB or 10MB, offers a practical solution.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The 5MB card costs $599, which is not cheap, but it lets you store a huge amount of data files. In fact, you can store applications or anything else you want, but data files are the real advantage of a memory card like this. The usefulness of this handheld computer is greatly extended.

Just as important as the general usefulness of SDP Storage Card, are the implications for memory devices of the future. Traditional hard disks are thought by many to be an inferior technology. They are fragile, breakable, and slow compared to active memory. Although tremendous advances have been made on these devices, they still seem like the weakest link in the computer chain.

Memory has always been too expensive to use as a mass storage device, but that may all be changing. Over time, memory has come down in price dramatically. It may just be that cards like this Sundisk product point the way to the future. These cards offer advantages over competing storage devices. They are completely transportable between machines. (You can take this storage device with you anywhere, it fits comfortably in your shirt pocket.) Access is fast as the data does not have to be mechanically transferred.

While PCMCIA cards are proving themselves to be particularly well suited to portable machines, desktop machines are beginning to appear with the slots; add-on devices that fit into desktop machines and allow you to use PCMCIA cards are coming to market. With PCMCIA capability on a desktop machine, there is no longer a reason to connect small machines with larger ones for the transfer of files. Simply swap the memory card out of the portable unit into the larger machine and copy files from one drive to another.

Let your imagination go and you can easily come up with many other advantages to this kind of universal memory device. It looks like this is just the beginning of a trend that may well change the way we manage the storage and transfer of files between computers of all sizes. For me, the goal is to be able to easily connect different computer systems so files can move from machine to machine as we use the right computer for the job.

FILE TRANSFER CHOICES

While this may be the wave of the future, there is still a need to physically connect machines together to transfer files back and forth. The leader in this field has long been Traveling Software with their LapLink software. They have just released the newest version of their landmark product, LapLink V. While the product builds on the foundation laid in earlier versions, there are additions that make this new release worth considering if you routinely are engaged in transferring files between computers.

On the surface, the most significant change is that you can install the software to run in the background under Windows 3.1. In fact, the interface is identical for both the DOS and Windows adaptations. As you install the software, it asks if you want to install it to run under Windows. If you answer yes, an icon is placed in the Windows program manager. You can, however, run the program in either a DOS or Windows environment.

LAP LINK V

There are a number of enhancements to this newest version of LapLink. Refresh Directory is just what many of us have been asking for. It lets you copy newer versions of only those files that already exist on the target computer. No other files will be copied with this command.

Clone Directory lets you make an exact copy of a selected source directory on the target computer. This is useful after you have cleaned up your files on one computer and want to duplicate the files on a second machine. Another twist on these ideas is the Synchronize command which makes two directories identical by taking the latest versions from each directory and transferring them to the other machine.

If you have tasks that are frequently repeated, you can create macros that do the tasks and then schedule these procedures to be done automatically on a daily, weekly or other repeating schedule.

Traveling Software has also added to the modem capabilities of the software. In previous versions, you could connect to another computer through a modem, but the remote capabilities now include a telephone directory so you can store frequently called numbers for ease of use. High-speed modems are also accommodated.

And finally, the newest version of LapLink will also work to transfer files on a peer-to-peer basis on a network. A network version is also available that is stripped down to meet the needs of network-only applications ($99.95/workstation).

If you have need to copy files and directories between computers on a regular basis, you need LapLink V. If, however, you only need to carry data from a few directories back and forth between your computers, I recommend FileRunner. This is the simplest file transfer utility available and works flawlessly. When you leave one location, you insert the FileRunner disk, hit a few keys, and within a minute all of the files that you need are updated for transfer to your other computer. I don't see LapLink and FileRunner as competing products. Rather, I need them both on all of my computers. ■

COMPUTER Of The Month:

Panasonic's CF-1000

RESOURCES:

Panasonic CF-1000, $1,699
Panasonic Communications & Systems Co.
Two Panasonic Way
Secaucus, NJ 07094
1-800-742-8086

From time to time a notebook computer comes along with features that really excite me. This month's machine is one of those. The basic description of the computer is not all that different from the competition, but the features set it in a class by itself. The Panasonic CF-1000 is a 386 running at 25MHz and supplied with 4MB of RAM, expandable to 12MB. But that is merely the briefest description. In fact, the chip that runs the unit is AMD's revolutionary new 3.3 volt model which means extra long battery life.

This low-energy CPU gives you between three and five and a half hours of use, depending upon how carefully you conserve power. But the kicker is that you can extend battery operation up to eleven hours by using an additional nickel metal hydride battery ($200) that fits in the same place as the removable floppy drive. Panasonic reasons that you may not need your floppy drive all the time—especially when you are away from a power source. So they have designed the floppy drive to come out, leaving room for an additional battery pack.

Nickel metal hydride batteries have advantages over nickel cadmiums. First, you do not to have to completely deplete the battery before recharging, which means you can always leave home with a full charge! Secondly, recharge time is a mere seventy-five minutes when the computer is not in use. The Panasonic CF-1000 has enough battery powered work time to let you work comfortably on your flight to Europe. Other computers will soon be arriving with this capability, but this one is here now. If long battery operation is important, this is the computer to look for.

Panasonic has designed its sophisticated power management software so that it not only extends battery duration, but also lets you configure the machine so that you do not have to exit your application before turning off the power. The computer retains your application and files in memory. The next time you turn the computer on, it will open to the application and files you were working with earlier.

But before I get ahead of myself, let me describe the machine a bit more fully. It weighs 5lbs. and is only 1.25" thick. Its sleek design and trim dimensions make it a breeze to carry around. The basic model comes with a 60MB hard drive. Each unit comes with Super-Stor disk compression software installed. This means that your computer will effectively have a hard disk capacity of 120MB. Panasonic has announced that soon this machine will be available with a 170MB hard drive, but no price has been set. The capacity of this model will also double because of the inclusion of Super-Stor.

When you open the CF-1000 and turn it on, the 9.5" VGA LCD is crisp and clear. If you are working in a permanent location, and choose to use an external color monitor, it is simple to attach through the VGA port on the back.

The keyboard is well designed. Panasonic has done what I wish all manufacturers would do: use the tried and true layout that works for typists. Separate cursor movement keys are included as well as PgUp, PgDn, Home, and End keys. And all of the keys are exactly where I would wish them. Still, if this keyboard cramps your style, you can attach a PS/2 keyboard of your choice.

All of the standard accessories are available. There are three modem choices. The top of the line speeds along at 14,400 bps ($500). A docking unit ($600) lets you use expansion cards. And finally, a carrying case will set you back $35.

The Panasonic CF-1000 comes standard with MS-DOS 5.0, Windows 3.1, and Super-Stor. Unfortunately, you will have to buy a mouse if you use Windows. This computer has many features, making it a first rate contender in the marketplace. ■

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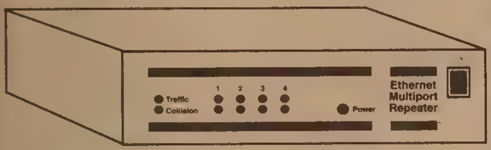

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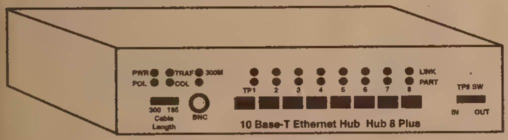

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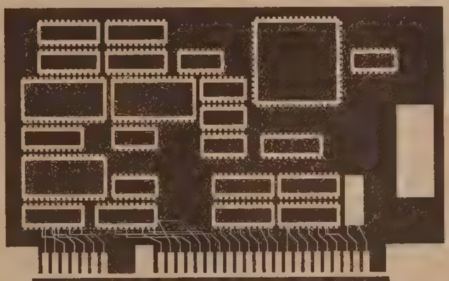

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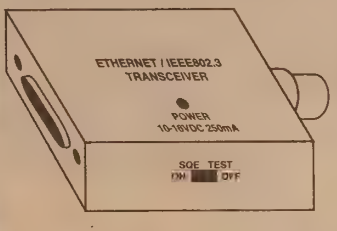

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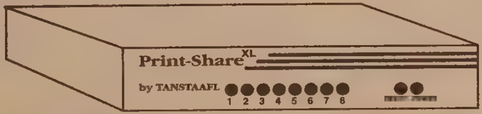

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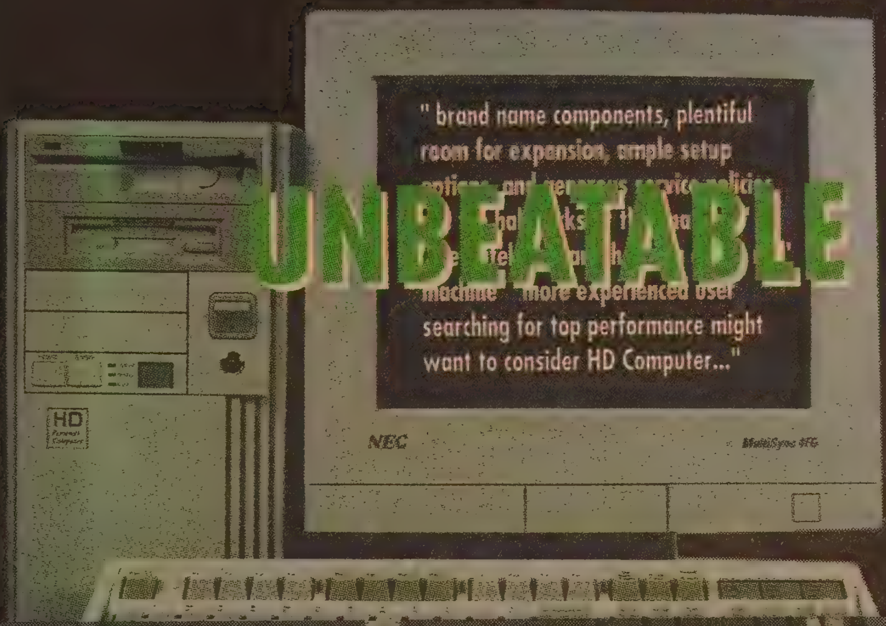
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On Starting A Telecommuting Program

Here Is A List Of Issues To Address And Steps To Take Toward Developing A Successful Telecommuting Program At Your Workplace.

BY ROBERT MOSKOWITZ

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During the last half year or so that these articles on telecommuting have been appearing, readers have begun to let me know they're thinking more and more concretely about getting a telecommuting program started in their own companies. To help, I've put together a checklist of steps to take en route to a successful telecommuting effort.

The basic starting point is to evaluate the need for and potential benefits of allowing people to telecommute to work. In a company where nearly everyone does hands-on work with specialized equipment at the plant, there's likely to be very little need or benefit from telecommuting. But in a company where dozens or more employees do administrative, clerical, contact, planning, or creative work, some people may well be able to accomplish more by working off-site one or more days per week. The company is quite likely to benefit from telecommuting in several ways: increased motivation, loyalty, and productivity; reduced absenteeism and turnover; less need for office space and equipment; and—often the principle motivating factor—easier, cheaper compliance with applicable air quality standards.

By allowing workers to telecommute, a company eliminates the need for other, possibly more expensive, alternative means of cutting back on total number of commuting trips to work, and the consequent environmental pollution its workers generate in getting to work. It also can also tap a larger pool of potential employees living in a wider geographical area.

If the need and potential benefits make telecommuting an attractive option for a company, the second step would be for proponents of telecommuting to get management lined up behind the effort.

If you are the business owner, or manager, you've already accomplished this step. But if you're not, you'll have to lobby for the changes you want to make.

One way is to show management the widespread desire for telecommuting among key employees. Another approach is to document the benefits the company will obtain from installation of a telecommuting program.

An important element in any effort to win management support for telecommuting is to provide background information on the topic: case histories, evaluative reports on other company's programs, statistics on good and bad results from telecommuting experiences, and general descriptive information on how these programs work.

> ***Telecommuters*** can be found among certain job types, such as those who work alone at least part of the time, those who don't require a big investment in equipment, and those who ***need not be in the central office to get their work accomplished.***

Sometimes, the intangible benefits can be the most persuasive. For example, suppose key employees are disgruntled about commuting, but would be persuaded to stay on if they could begin to telecommute. Just to keep these people happy, management may well institute a program, or at least give it fair consideration.

Assuming you've passed these first two hurdles, the next step in bringing a telecommuting program to your company is to establish a steering committee, with at least one telecommuting coordinator.

The steering committee should include both management and telecommuter representatives. It should take responsibility for overseeing all the promotional, practical, and policy-making steps toward telecommuting which the company undertakes in the future. The coordinator is the lightning rod and chief promoter of the program. All criticism of telecommuting, and specific problems or complaints, will land on the coordinator's desk. Meanwhile, the coordinator will be ceaselessly promoting within the company the concept and advantages of telecommuting, and will be providing educational materials, organizing workshops and training programs, recruiting potential telecommuters, and otherwise getting people to try the program on for size.

You've already determined—in your "needs and benefits assessment"—that a significant number of employees are candidates for telecommuting. The next step is to identify the specific people who will actually attempt to telecommute. You're probably one

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Robert Moskowitz is a business consultant based in Woodland Hills, CA, who writes frequently on productivity, office automation, and technology.

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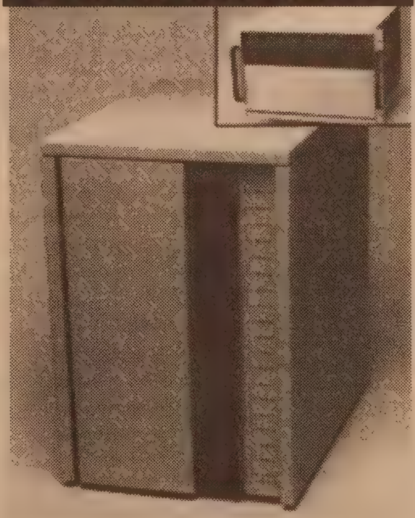

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of them. You probably know a few others. Find the rest by posting public notices or otherwise alerting employees to this new opportunity.

Telecommuters can be found among certain job types, such as those who work alone at least part of the time, those who don't require a big investment in equipment, and those who need not be in the central office to get their work accomplished. A wide variety of administrative, clerical, sales, managerial, and creative jobs include at least some responsibilities that can be worked via telecommuting.

Telecommuters can also be identified by certain personality types, such as: self-motivated individuals, people who do not need close supervision to meet their performance goals, people who accomplish more by concentrating deeply than by spending time with others, and people who are more self-disciplined than average.

Don't overlook the power of word-of-mouth. Telecommuting is not always appealing or even understandable in the abstract. But if you see Joe staying home from work one a day a week, you begin to get the point. One motivated tele-commuter can often find half-a-dozen other employees who'd like to apply for the privilege.

Each person interested in telecommuting should submit an application, detailing the types of work he or she plans to do off-site, estimating equipment and other requirements, and indicating a supervisor who can be contacted for his or her input on the candidate. The coordinator may help the applicant think about and answer some of these questions. To aid in later telecommuting program evaluations, the applicant should provide background information on his or her work and attendance patterns, levels of productivity, and feelings about job satisfaction and loyalty.

Before the program can really take off, however, a company must establish a set of policies on tele-commuting. This is the next hurdle facing the steering committee and project coordinator.

The policy can be brief or extensive, vague or highly specific, usually in accord with what the company expects and what policies it has previously enunciated for other operational areas. But whatever wording is used, the policy should cover:

- Who can telecommute, and who cannot;
- What telecommuting is, and what it is not;
- When telecommuting can take place; and

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- How telecommuting privileges are to be initiated, and terminated.

Some companies specify exactly how much they are willing to spend to support each telecommuting employee, and exactly which costs the company will cover. Others leave such matters open to case-by-case resolution.

Most company policies assign responsibilities for oversight of the telecommuting program, and detail who will solve problems that may arise. For example, if a telecommuting employee is difficult to reach by telephone, who is responsible for putting in a second line at the employee's off-site workplace?

A number of companies make clear who makes choices about each employee's telecommuting, such as what hours and days are appropriate for this form of work, and what happens if there is a conflict in scheduling.

The best policies tend to set forth the company's attitude about how telecommuting fits into the traditional patterns of work: Is it a privilege or a right? Voluntary or mandatory? Does telecommuting take one out of the loop for promotions and challenging opportunities? Does failure at telecommuting impact one's reputation and overall evaluation? This is important because a small percentage of people who try telecommuting find they'd prefer to keep working the more usual way. Company policy should make clear to them, going in, how such a choice will reflect on them in the future.

If **the need and potential benefits make telecommuting an attractive option for a company, the second step would be for proponents of telecommuting to get** ***management lined up behind the effort.***

For some companies, data security is a major issue. Their telecommuting policies must therefore make clear what data may and may not be utilized off-site, what procedures must be followed to take data off-site, and who takes responsibility for implementing these procedures.

With all these procedural matters out of the way, it's time to tackle some of the nuts-and-bolts issues that come along with telecommuting. For example, some people in some jobs will require a computer, network connection, printer, facsimile, modem, and cellular phone in order to accomplish their responsibilities. Others will need just an ordinary telephone and a desk. Each telecommuter will raise some specific issues to be discussed, decisions to be made, and problems to be solved. Here's a brief rundown of some major concerns:

Funding—telecommuting programs generally save companies money. But they many need a "jump start" in the form of funds to get the program rolling. One major nuts-and-bolts issue is to raise all the money you'll need to roll out the first phase of the program.

Candidate approvals—people who want to telecommute have been asking for permission and submitting applications since you began talking up the program. A practical task now is to approve some of these people for training and—if they make it through satisfactorily—for equipment outfitting.

Telecommuter agreements—each candidate approved for telecommuting should negotiate and sign an agreement with his or her supervisor detailing the terms under which he or she will telecommute. The agreement should make clear all the rights, responsibilities, and privileges that telecommuting entails.

Equipment outfitting—equipment is not always a big concern in telecommuting. Some people need only a telephone and a pencil to telecommute successfully. But some applicants will need more, and this is the time to begin locating the equipment they need, getting authorizations to purchase or rent any new items required, and setting things up properly for each of them.

Locations—many people can telecommute from their own homes. But some cannot, or don't want to, and need another place to work. As we've detailed in previous columns, there are commercially available telecommuting centers. Telecommuters can also use rented space in an appropriately staffed "executive center" office, or even use office space "swapped" with another company or division, allowing telecommuters to work from a relatively nearby facility that's mainly a central office for other workers.

With a cadre of eager telecommuters ready to start the program in your company, it's time to begin motivating and training them for their new method of working. Most of us have spent a lifetime building the habits of going to work (or school) and then coming home. Telecommuters, many of whom will work at home, must unlearn these habits and learn how to separate work-oriented activities from home- and family-oriented activities—all happening in the same place.

continued on page 70

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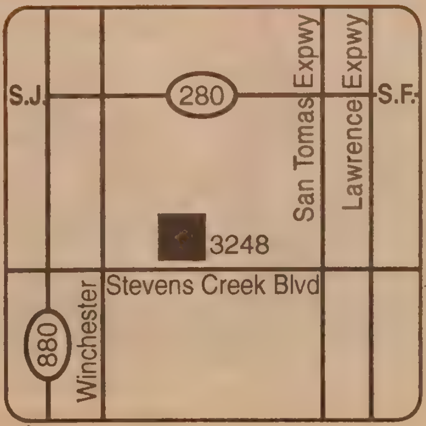

WordPerfect Office 4.0

Multiplatform Information Sharing

BY YACCO

On the 22nd of March, WordPerfect invited a snow-load of journalists over to the Hard Drive Cafe in Orem, Utah to see WordPerfect 6.0, but there were also opportunities to see Office 4.0 (which was announced in January at NetWorld Boston). All of us had a great time frolicking in the snow at Robert Redford's Sundance resort, mostly sliding down steep slopes of it with thin little boards bound to our feet.

LOCAL AREA NETWORKS

RESOURCES:

WordPerfect Office (all prices include UNIX versions) Administration and connection package: $295 (all versions) Client packages: $79.95 (single), $495 (first five), etc.

Word Perfect Corporation
Orem, UT
(801)225-5000

Venison dinners, double espressos, and what is undoubtedly the best chocolate pecan pie served on any mountain, anywhere, also contributed mightily to what some wags suggested was a deliberate distraction from the apparent lack of products for MS Windows. It was certainly just the environment to suck us all into a fog of well-being and satisfaction that might transfer to the products on display. In Orem, it seems, you can be in a blizzard even when it isn't snowing—and WordPerfect controls the weather.

WORDPERFECT AND THE WORKGROUP

While WordPerfect wasn't emphasizing Windows at this extended press conference, there was plenty of focus on communication, especially as it applies to sharing information in workgroups. Although WP 6.0 is the processing heart of a new WordPerfect strategy, a lot of importance was attached to the word processor's integrated email, voice annotation, and fax capabilities.

Although WP 6.0 is the processing heart of a new WordPerfect strategy, a lot of importance was attached to the word processor's integrated email, voice annotation, and fax capabilities.

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In fact, the company strategy now revolves around something called WISE, a somewhat nebulous acronym standing mostly for marketing hype, but also nominally for WordPerfect Information Systems Environment. In the words of company president Alan Ashton, the company is "focused on the WISE cross-platform strategy. We really think it makes sense for our customers."

Nevertheless, there is substance behind the blarney.

The idea, they say, is to provide WordPerfect products that satisfy in three areas—processing, presenting, and sharing information—and to integrate these products with the key products of other vendors. WordPerfect itself is the company's information processor. It's missing a database, but has a blazingly fast text-search retrieval system. The DOS 6.0 product also has spreadsheet capabilities built right into its tables, and there's an integral grammar checker, scalable fonts, graphics modes, and much more in its word processing arsenal. The new and forthcoming versions of WordPerfect Presentations are formidable presentation products, and they're multimedia enabled. Even the DOS version includes one hundred MIDI files, and has built-in paint and drawing tools—including Bezier curves—and an autotrace function.

WISE COMMUNICATIONS

What characterizes WISE is communication—not just communication of email, but of schedules, calendars, sound annotation, and other information and message types. At the core of this message and information sharing is Office. All of the products are tied together through the communication paradigm. Office is currently on release 3.03 on the Mac and release 3.1 on others, including DOS and Windows. The Windows version presently supports only email. Both DOS and Mac versions have email, a calendar, and a scheduler. The DOS version doesn't have a GUI interface, and won't until release 4.1 or later. However, any mailbox license, including a UNIX license, lets you communicate to the mailbox with any client.

Client and server versions of 4.0, for UNIX, Mac, and Windows, are expected to debut at the end of Q2. It's a significant upgrade. You can employ a search to find free time for meetings; meeting schedules include provisions for sending out carbon and blind copies. An aggregate line includes all schedules in a single view. That makes it simple to see when everyone is free at the same time. Context-sensitive menus are on the right mouse button, a la Borland's new Object Inspectors. GUI versions of the product have a neat addition called the shelf, where you can drag inboxes, outboxes, or any other view (window) including proxies (see below) and hold them for immediate, single-click access. (As yet, there's no graphical interface for the DOS version, but you can move and size windows.)

Office makes controlling messages easy. It lets you check on the status of routed messages, and see inbound and outbound messages in the same type of window; there are filters for screening mail. In addition to mes-

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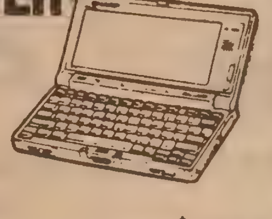

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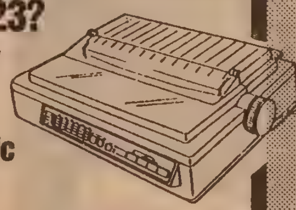

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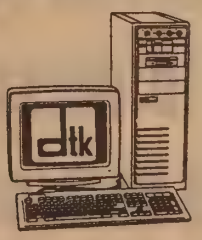

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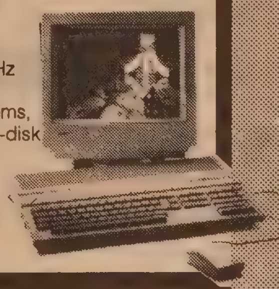

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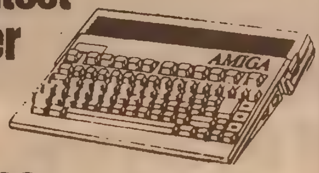

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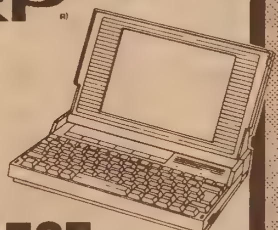

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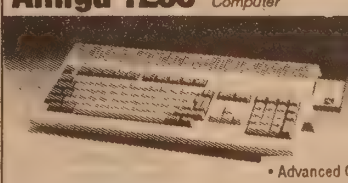

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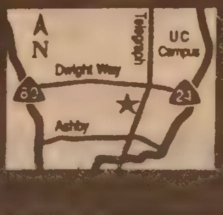

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sage tracking, even current versions of Office let users retract undelivered mail. (Go ahead and send that resignation. You can always decide if you meant it later.) The 4.0 product will add the ability to send appointments and tasks for a prioritized list. Simple text searches are supported too. And although you can't specify Boolean or fuzzy strings, you can look for any type of message, and search in any portion of a message except attachments (such as a WordPerfect file).

Office makes controlling messages easy. It lets you check on the status of routed messages, and see inbound and outbound messages in the same type of window; there are filters for screening mail. In addition to message tracking, even current versions of Office let users retract undelivered mail.

Rescheduling capabilities are also enhanced in 4.0. Tasks remain with you until they're accomplished or they roll forward. Overdue tasks are highlighted.

You can also delegate tasks. There's no enforcement mechanism on tasks that are sent out, but the system reports their progress automatically to the persons who delegate them. Office's Routing slips allow you to identify a predetermined sequence for any message type except appointments. It's a very well thought-out system for follow-up.

Access controls in Office will now include "proxy" access to the system. This allows you to give access privileges to people without going to an administrator. They can then act as a surrogate with limited rights to your mailbox. You set the limits, and you don't even need to be logged on for the surrogate to have access.

There is also a Rules facility, which is akin to style sheets for message handling. Specify a filter for the types of messages you want (subject, message text, from, cc, etc.) and where to put them (folders), or forward, purge, reply, accept, delegate, delete/reject (snub). Voila! You've automated your message screening. ■

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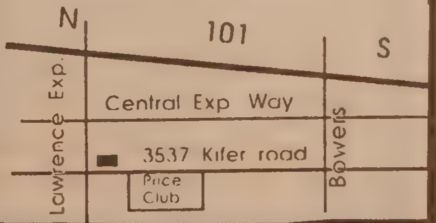

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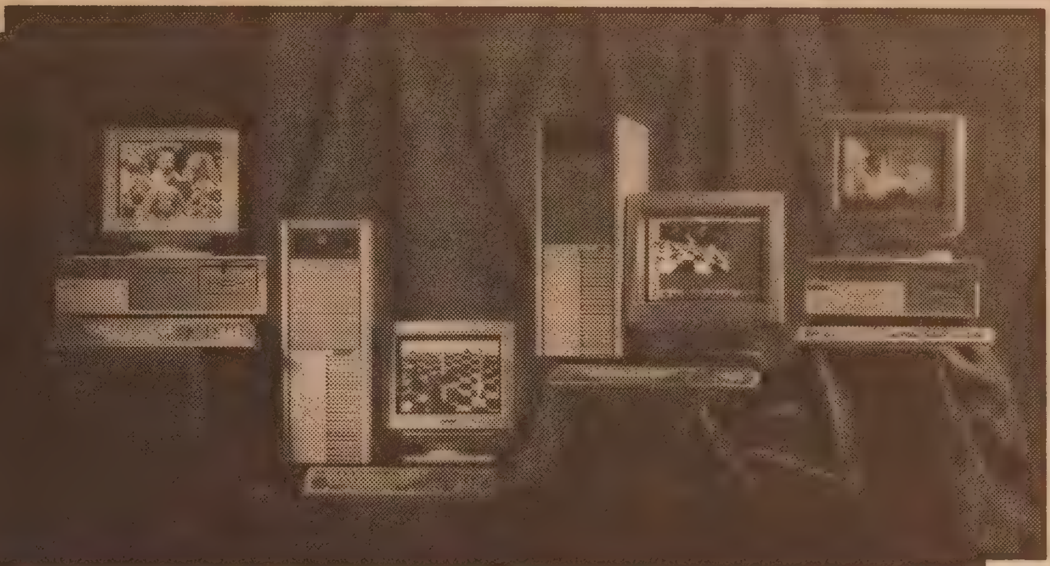

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Tuesday, May 11, 9:15 - 10:00 a.m.
Wayne Rosing, President
Sun Microsystems Laboratories

Wednesday, May 12, 9:00 - 10:00 a.m.
Andrew Heller, Chairman & CEO
HaL Computer Systems Inc.

Thursday, May 13, 9:00 - 10:00 a.m.
Dr. Charles Geschke, President & COO
Adobe Systems Inc.

SPECIAL PRESENTATION

Tuesday, May 11, 12:15 - 1:00 p.m.
Scott McNealy, President & CEO
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PLENARY SESSIONS

Tuesday, May 11, 2:45 - 3:45 p.m.
Rikki Kirzner, Principal Analyst
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SunWorld '93 Exhibitors' List as of April 29, 1993.

The Intermittent Appearance Of Persians

Reflections On UNIX Wars

BY BENNETT FALK

Remember the city-states of ancient Greece? You know, Athens, Sparta, Corinth, Thebes, and all the rest: each enthused with its own autonomy and jealous of whatever wealth its neighbors possessed.

The citizens of these states seem to have had a boundless fascination with forging alliances, betraying their allies, and making war for dubious causes. It might be said that they were simply re-enacting in some less noble way the themes of the Trojan War, an even more ancient enterprise elevated to near-mythic status.

The inhabitants of the city-states also generated a fair amount of anxiety waiting for their cities to be sacked by invading Persians, under the leadership of one Xerxes or another. Persians appeared sporadically and wreaked havoc. Eventually, Macedonians, under the only slightly more sympathetic leadership of Alexander the Great, arrived with compelling arguments regarding the benefits of kingship as a suitable remedy for the intermittent appearance of Persians.

UNIX

UNIX AND THE TROJAN WAR

There are, of course, certain parallels between the behavior of the city-states of ancient Greece and that of modern computer companies. After all, we, too, have inherited the story of the Trojan War.

Take, for example, the UNIX industry.

Since 1988 the companies that make up the bulk of this industry have been engaged in a struggle over future development of the UNIX operating system.

The origins of this struggle are not easily disentangled. Possible causes include sour grapes over AT&T's success, a wave of corporate paranoia, or genuine skulduggery between AT&T and Sun.

In 1987, Sun and AT&T came to an "arrangement" that gave AT&T a large holding in Sun, at about the same time that the groundwork was being laid for a new release of UNIX (System V, Release 4, or SVR4). In the wake of this arrangement, UNIX development would be carried out on three "reference" platforms: AT&T's "3B" line based on Western Electric processors, Sun's SPARC processor, and the Intel 80386 processor. New UNIX development would be more or less concurrent on these architectures, and ports to other architectures would be undertaken after the initial development effort.

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In early 1988, the companies who marketed UNIX on other architectures cried "Foul!" very loudly. They accused Sun and AT&T of trying to bias further development of UNIX in favor of their proprietary CPU architectures. The licensees insisted that the status of UNIX as an "open" system be protected.

Remember the city-states of ancient Greece, each enthused with its own autonomy and jealous of whatever wealth its neighbors possessed? The citizens of these states seem to have had a boundless fascination with forging alliances, betraying their allies, and making war for dubious causes.

Later in 1988, AT&T created a strategic advantage for its UNIX products when the System V Interface Definition was accepted as the standard by which competing operating systems would be evaluated for an important contract with the Air Force. Acceptance of the SVID as a standard would give UNIX System V a significant advantage over non-UNIX competitors (such as Digital Equipment's VAX/VMS system), and even over versions of UNIX developed from the Berkeley Software Distribution. AT&T won the Air Force contract, and the discontent, paranoia, and allegations of unfair competition intensified.

Whatever the motives, a line was drawn with AT&T and Sun Microsystems on one side and IBM, Digital Equipment Corp. (DEC), and Hewlett-Packard on the other.

UNIX INTERNATIONAL VS. OSF

Now the first thing to note about this struggle is that the participants are all hardware manufacturers. Virtually all these companies license UNIX from AT&T to build operating systems for their various hardware lines.

In 1988 AT&T created UNIX International, a subsidiary to manage UNIX development independently of its hardware production and to give licensees a way to participate in the standardization of UNIX.

The licensees retorted by forming an organization of their own (the Open Software Foundation) to protect their interests in the further development of UNIX.

Each side recruited allies. Acrimonious words were exchanged, peace talks were begun, peace talks were broken off. Finally, the two sides actually did battle in three areas: the UNIX operating system itself, user interface technology, and distributed computing technology.

The operating system battle was difficult for OSF. The whole enterprise of trying to standardize the UNIX world by producing yet another version of UNIX is steeped in irony. An OSF version of UNIX (OSF/1) was announced with much ballyhoo in October of 1990. It would be, the press releases claimed, a superior version of UNIX, particularly in system security and in multi-processor support. However, since OSF/1 was a new operating system, it would be quite some time before applications from third-party vendors would be available.

The rollout of OSF/1 was slow: the first production release was available from DEC in January of 1992. Promoting the new operating system was risky for the members of the OSF consortium. After offering OSF/1, DEC was criticized for not being entirely candid about its UNIX offerings: how, for example, did the new OSF/1 offering relate to Ultrix (DEC's existing UNIX product)?

Virtually all of the companies involved in OSF already marketed versions of UNIX and faced similar risks. They were understandably cautious about prodding their respective customers to upgrade to a new and untried product.

By contrast, Sun staged a reasonably successful migration process for the operating system distributed with its computers. The Sun Operating System gradually metamorphosed from being a variation of Berkeley UNIX to a full-fledged implementation of System V Release 4.

OSF worked the User Interface issue to better advantage. Some sort of Graphical User

Interface would be necessary to make UNIX systems competitive with personal computers. Since UNIX had been developed long before the new user interface technology, any graphical user interface would be an add-on to the basic operating system.

Each side in the dispute over the further development of UNIX scrambled for the most convenient, ready-to-ship product. Sun and AT&T endorsed Sun's "OpenLook" user interface. The members of OSF closed ranks behind Motif, a user interface built under MIT's X Windows.

X Windows and Motif were already widely distributed. OpenLook was not. Simply trademarking its version of Motif gave OSF tremendous visibility.

Finally, in the connectivity battle, OSF may have best realized its ambition to be the conscience of the UNIX industry. The OSF consortium created the Distributed Computing Environment (DCE) which is essentially a collection of services and an application programming interface (API) for resource sharing among computers. Like the Graphical User Interface, DCE is a layered product: it can be added to an existing UNIX operating system installation.

The DCE includes facilities for remote procedure calls, directory services, threads, security services, and a distributed file system. In one way or another, these services are already offered by many conventional UNIX systems, but OSF has packaged them and voiced a commitment to standardize the DCE services across architectures.

Sun responded to DCE by expanding the scope of its popular Network File System product, creating the Open Network Computing environment (ONC+).

One of the interesting questions of 1992 was whether Sun would offer DCE for its hardware lines. Sun offered a third party version of DCE for its computers, but declined to incorporate DCE into the Solaris versions of its operating system. Additionally, throughout the year there were rumors, and denials of rumors, concerning negotiations between Sun and OSF on the issue of DCE support.

But the technical issues over which these companies are contending generally take a back seat to other considerations.

The companies involved in the UNIX Wars have, in general, prospered, realizing very large revenues from their UNIX products. Hewlett-Packard posted roughly $4.1 billion dollars in revenue from products that have something to do with UNIX (representing about 25% of all of HP's revenue). IBM's UNIX-related revenue was $2.8 billion (5% of IBM's total revenue), and DEC's was $1.8 billion (about 15% of the company's total revenue). AT&T, having bought NCR, posted nearly $2.1 billion in revenue from UNIX products; Sun's was $3.9 billion. (See Carolyn W.C. Wong, Gary Andrew Poole, "The Top 10 UNIX Companies" in *UNIX WORLD*, vol. IX, no. 12, p. 46ff.) If Sun seems more tenacious about some of the issues at stake in the UNIX dispute, it may well be because Sun depends on UNIX for all of its revenue.

THE SAGA CONTINUES...

Occasionally the interactions of the companies lapse into soap opera. AT&T merged with NCR in 1991, and to do so it sold much of the Sun stock acquired in 1987. This set in mo-

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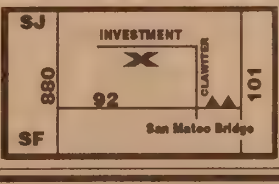

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tion rumors that Sun was displeased, and might entertain more cordial relations with OSF.

On the other side, DEC did not do well with the release of OSF/1, and that led to rumors questioning DEC's commitment to OSF. Potshots were taken at DEC and the Distributed Computing Environment (DCE) on behalf of IBM's System Application Architecture (SAA).

Throughout the dispute, some companies have sought membership in both UNIX International and OSF, momentarily blurring the division between the two sides.

Customers of the vendors engaged in the UNIX Wars formed the Open User Recommended Solutions (OURS) group in an attempt to focus the dispute more clearly on usable standards.

Finally, in 1992, Novell, the network company, began to get involved, and gradually, the terms of the dispute have become less frivolous. Novell and AT&T's UNIX System Laboratories began a joint venture (UNIVEL) to produce and market an well-integrated version of SVR4 for desktop personal computers. Following the announcement of this venture, Novell sought membership in both the UI and OSF. In December of 1992, Novell purchased UNIX System Laboratories outright for $350 million, an unexpectedly low sum given the current volume of UNIX-dependent revenue.

Novell's ownership of UNIX has had the effect of focusing the competitive energy in the industry more clearly on Microsoft. Microsoft has always been a source of anxiety for UNIX vendors, but as long as UNIX was owned by a competitor for hardware sales there were more pressing issues than attempting to second-guess Bill Gates.

However, the long awaited Windows NT operating system from Microsoft is in the final stages of beta testing and should be generally available in May of 1993. With this product, Microsoft has the potential to expand beyond the PC market: Windows NT will also run on DEC's new 64-bit Alpha computers, and could be ported to other architectures as well.

The effect of refocusing the industry's competitive energies was evident at the March, 1993 UniForum meeting in San Francisco, where the noteworthy event was an announcement from a consortium of companies that cut across the OSF/UI lines. (Sun, Hewlett-Packard, IBM, UNIVEL, UNIX System Laboratories, and the Santa Cruz Operation joined in the announcement; DEC, a founding member of OSF, was not represented, and this, of course, became grist for the mills of ominous speculation.)

The subject of the announcement was support from all these companies for a Common Open Software Environment (COSE). COSE seems to be a compromise between the two sides concerning connectivity and sharing of resources. In essence, it is a graceful way for everyone involved in the distributed computing debate to save face.

The approved COSE environment is essentially Motif-based, but with elements of OpenLook and HP's Visual User Environment. Additionally, it supports *both* ONC and DCE as standards for shared resource computing.

It would be premature to comment on the technical significance of COSE. The strategic significance, however, is unmistakable: the UNIX vendors have finally figured out who the Persians are. ■

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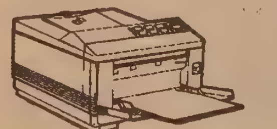

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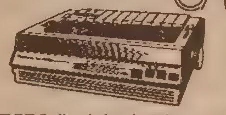

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continued from page 54

Training should cover a variety of topics, including how to establish performance goals, how to set up a good and productive environment at home or wherever the telecommuter will work, how to relate to and communicate with others while telecommuting, and so forth.

Another aspect of training should be mastery of any technical matters. For example, some telecommuters will use a computer at home. But this is different from using one at work, where the network is always available and logging on in the morning is simple and automatic. Training should familiarize these telecommuters with the finer points of using a computer and a modem to dial into the network and log on from outside the office.

Each telecommuter has a supervisor, who may or may not be a telecommuter, as well. These supervisors require their own training in such topics as: how to supervise a person working in another location, how to manage by "objectives" rather than by "visual monitoring," and how to coordinate the activities of a work-group when some employees may not be present every working day.

Telecommuters may be overwhelmed by the sudden freedom and flexibility they're given in fulfilling their responsibilities, and productivity can waiver dramatically during an initial period of acclimation. Supervisors can feel threatened by the sudden disappearance of part of their work force, and can have difficulty accepting that some employees can work effectively over long periods of time without physical observation and oversight by their supervisor. The training should anticipate these emotional difficulties, and get people adjusted to the unfamiliar aspects of telecommuting as quickly as possible.

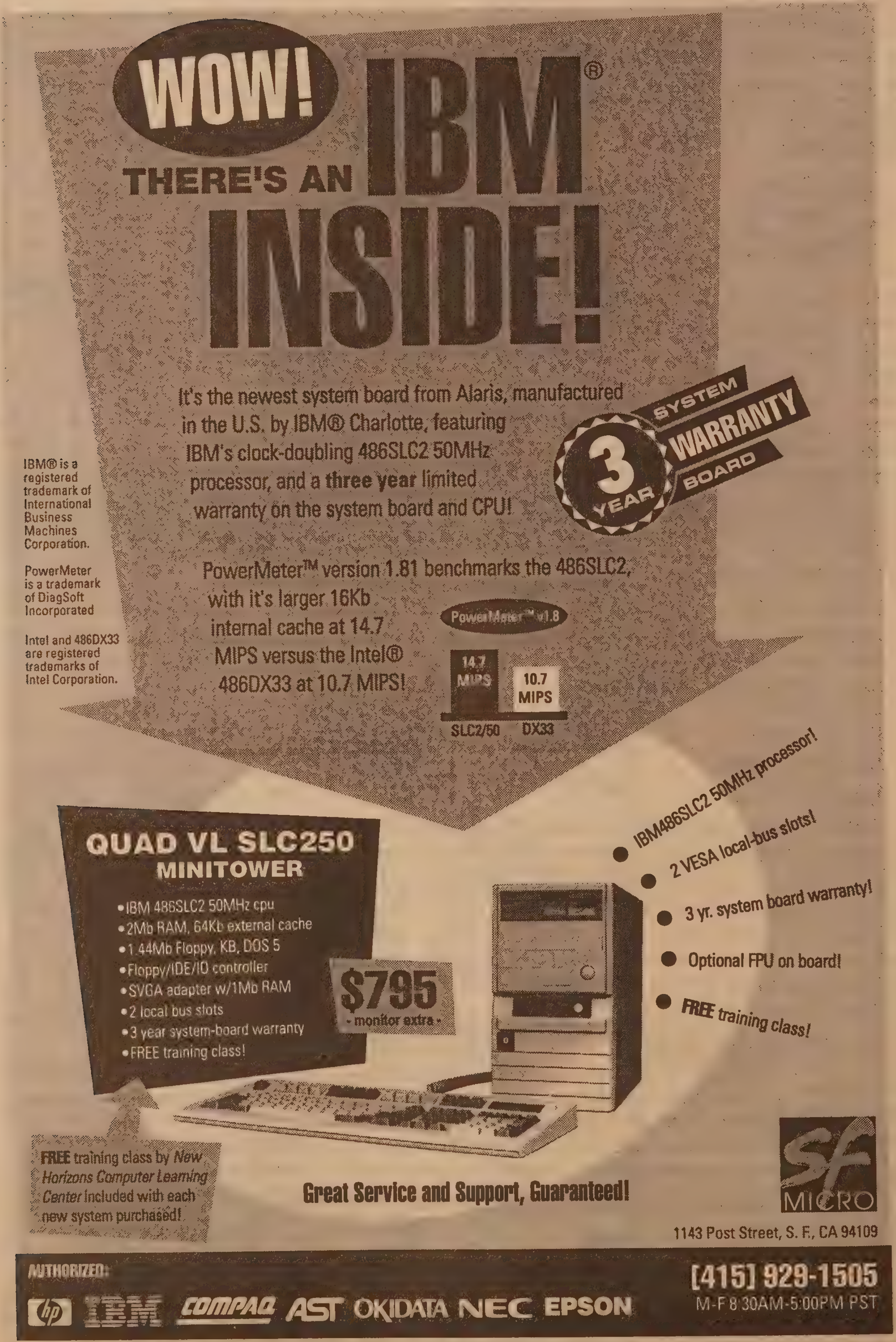
At a certain point, there's nothing left to do but get started. The steering committee and coordinator should agree on a start date. The first candidates will complete their training, establish their work locations, and begin telecommuting.

The first weeks may be difficult, because unanticipated problems will usually rise to the surface and demand immediate solutions. People may find they haven't been adequately trained, they need more coaching, or there are difficulties in remaining part of their work group when they're not actually in the office. There may be technical problems, too.

But telecommuting is no longer experimental. A million or more employees do it every day, as many as six and a half million in all. So try to view any problems not as insurmountable obstacles, but as wrinkles and bugs that have to be worked out of a new system before it functions optimally.

Even when hundreds of employees are telecommuting smoothly and productively, however, it's wise to keep evaluating the program. A good idea is to publish a monthly newsletter for telecommuters and interested candidates. In the newsletter, you can discuss issues of importance and ask for complaints, problems, and success stories.

You can use the newsletter to uncover any pockets of employees who are disgruntled, or who are having problems with telecommuting. And you can use it as a survey form to collect data for comparison with baseline data from employees' original applications about their pre-telecommuting days. Most such surveys find that telecommuters are more satisfied, more productive, and more loyal to a company once it lets them telecommute. ■



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DTC	2270VL	VLB/IDE	$ 95
Promise	DC200	IDE CACHE	$145
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	5FGE	17" Mulsync .28 NI Flat	$1165
	6FG	20" Mulsync .28 NI Flat	$2345
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	VSC6E	14" .28 NI	$ 339
	VSC15	15" .28 NI	$ 639
	VSC7	17" .28 NI	$ 975
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	Lantastic AE-2 Startkit	$449
Intel	Etherexpress 16 TP/ Coax	$125
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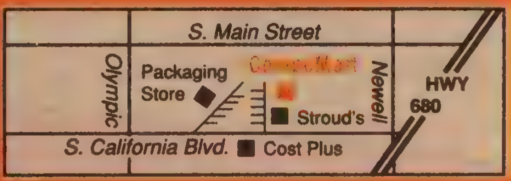

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	Scanman Color Hand Scanner	$ 554
Tamarack	ArtiScan Flatbed Scanner Color 600DPI	$ 950
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	BJ-200	$ 359
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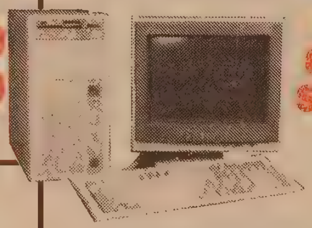

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386SX-33 w/CPU	109
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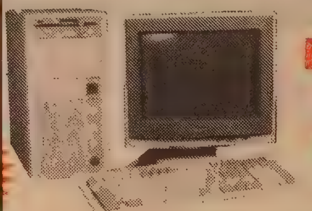

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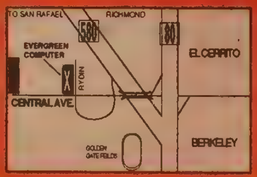

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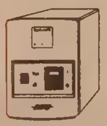

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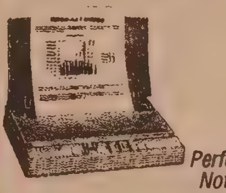

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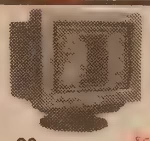

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COMPUEXPO

As Price Wars Force The Hardware Giants Into The Commodity Business, Independent Vendors Find New Ways To Compete.

As more than one observer has remarked lately, the personal computer industry is in a period not unlike the chaotic days when it first got started: new platforms, new capabilities, new potential applications—and no telling which hopeful entrepreneur's company will become the next Compaq and which will be the next Cromemco.

Vendors and customers alike are struggling to make sense of new processors (Intel's Pentium, DEC's Alpha, the latest offerings from MIPS and SPARC, the impending PowerPC, etc.), new platforms (Personal Communicators, PDAs, wireless networks, and so on), new standards (e.g. PCMCIA), and new ways of accessing and handling information (multimedia, client-server databases, and more). OS Wars are creating new quandaries, as Microsoft's NT, Novell's UNIX, IBM's OS/2, Apple/IBM's soon-to-arrive Taligent, along with the recently-ported-to-Intel NeXTstep and Sun Solaris vie for hearts, minds, and installed base. Customers need to invest their purchasing dollars wisely for their current and future needs; vendors need a sense of what buyers want now and what they're going to require later.

Meanwhile, the industry's infrastructure itself is changing beyond recognition. After years of losing sales to cost-cutting clone vendors, big-name players like Compaq and even the once-mighty IBM have entered the commodity computer market with extremely aggressive pricing, making it virtually impossible for small companies to compete. One reason they're able to do this is that they've abandoned their aversion to Not Invented Here syndrome—as product cycles become shorter and shorter (today's state-of-the-art is obsolete in 90 days), even the giants look to outside sources and collaborative relationships for the innovative technologies that help them compete.

Consequently, many small companies are moving from the low-cost box-moving business to a value-added approach in order to differentiate themselves from their competition. Says Allen Yu, a successful entrepreneur and OEM, and CEO of UNSC Investment Group, which produces COMPUEXPO: "The large guys tried to take the market back and dominate this market again, and hurt some of the second- and third-tier manufactur-

(l-r): UNSC's Susan Cooney, Allen Yu, Jessica Lo, and Leap Frog Marketing's Joe Bentzel

'93 Resources For An Industry Living In Interesting Times

By Mary Eisenhart

ers. Even though the large players in the market dominate the industry again, they're still missing a lot of points.

"In this industry there are a lot of entrepreneurs, many with an engineering background. Most companies with engineering backgrounds are using existing PC hardware platforms to switch to communications products, imaging and multimedia products, telecommunications products, and remote networking. Based on their background, they have the capability to do that, to switch the company to a more technical and more specialized orientation, to try to define a vertical market to get away from the price wars." And often, their customers include the IBMs, the Compaqs, and the other large companies they used to compete with.

Clearly it's a time when yesterday's strategies won't work, and new plans and alliances are called for. Entrepreneurs, vendors, and customers need to define new ways to create mutually beneficial relationships.

COMPUEXPO

Resources For Relationship Building

Enabling mutually beneficial relationships is the whole reason for COMPUEXPO, a different kind of trade show that debuted last year in Las Vegas (see "Clones: The Next Ten Years," Issue #93). The guiding principle for the show's existence is the belief that in contrast to the first ten years of the PC industry, in which a few large companies set the standards and dominated the marketplace, the next decade will be characterized by far greater diversity, global partnerships among specialized smaller players, and value-added marketing in an intensely price-competitive environment.

With Windows NT waiting in the wings, Novell announcing aggressive strategies for its newly-acquired-from-AT&T UNIX, and a host of new processors challenging Intel's long-established dominance, it's clear that defaulting to "IBM compatibility"—or even Intel or Microsoft compatibility—as the universal solution is about to become a thing of the past.

COMPUEXPO '93 is working to help its constituen-

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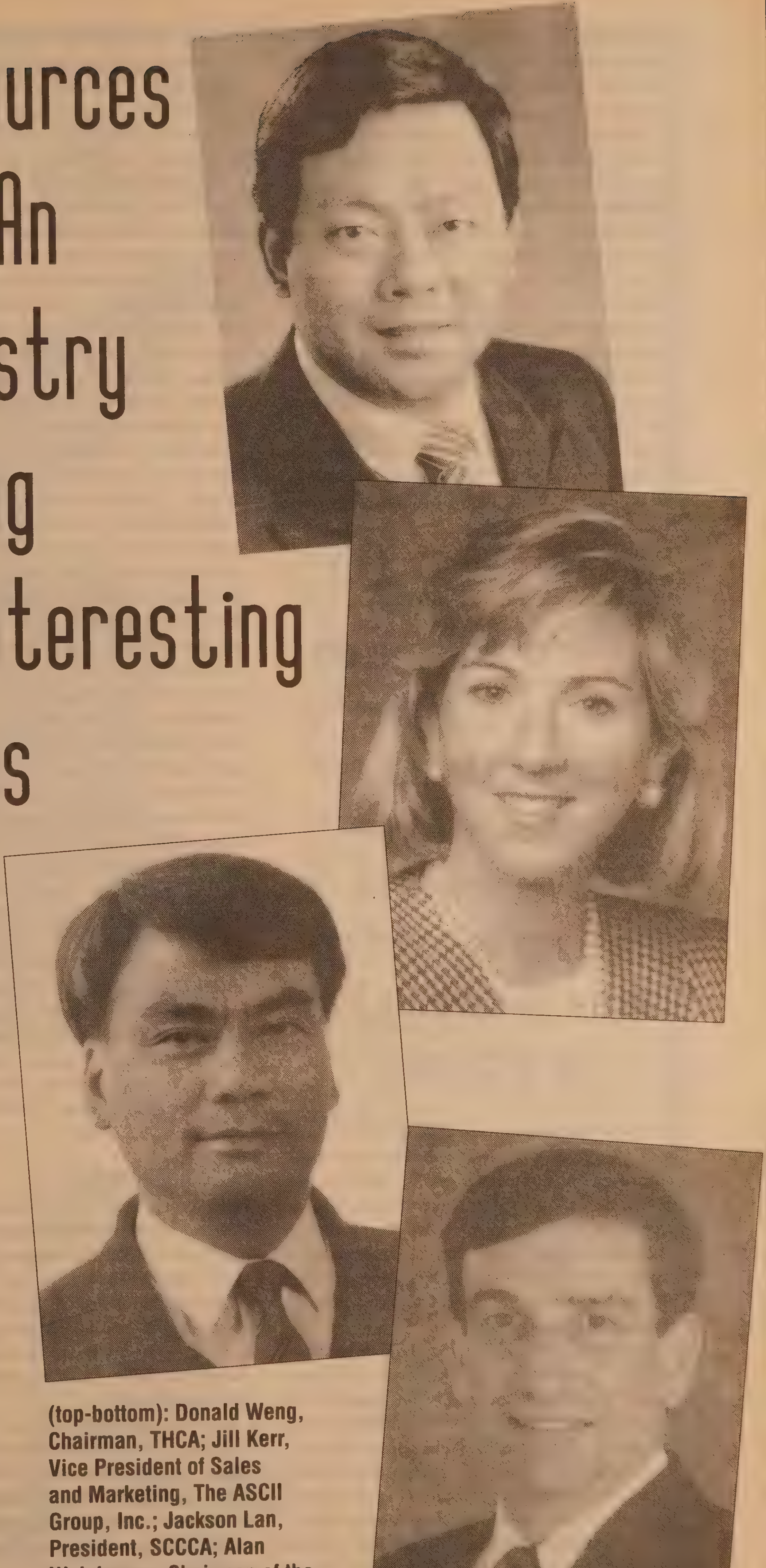

(top-bottom): Donald Weng, Chairman, THCA; Jill Kerr, Vice President of Sales and Marketing, The ASCII Group, Inc.; Jackson Lan, President, SCCCA; Alan Weinberger, Chairman of the Board, The ASCII Group, Inc.

cy of OEMs, entrepreneurs, and resellers deal with drastic change in the industry and take advantage of the opportunities it presents, from multiprocessor file servers to multimedia software applications.

Says Yu: "Windows NT supports different processors. It can be used with all the Windows software on the market, and on the mainframe. It changes everything—'Intel Inside' can't be workable anymore. They might dominate some percentage of the market, but it's not the whole thing."

And if Windows NT supports multiple processors, so does UNIX. Consequently, this year's exhibitors reflect a diversity unheard of for previous trade shows, with hardware based on MIPS and SPARC chips and UNIX-based software applications, as well as the ever-popular standards from Microsoft, Intel, and IBM.

Scheduled for September 9–11 in Las Vegas, this year's COMPUEXPO brings together a wide variety of resource providers to facilitate beneficial partnerships in a competitive, changing market. Technical innovation is crucial, but the innovator needs manufacturing resources to get the idea from prototype to product. Not to mention marketing resources to make potential customers aware of the product, and distribution resources to get it into the stores. Then there's also the necessary reality check: not all great ideas are useful enough to be viable in the marketplace.

> ALLEN YU:
>
> "A lot of entrepreneurs are switching their companies to a more technical and more specialized orientation, to try to define a vertical market to get away from the price wars."

Says Joe Bentzel of LeapFrog Marketing, COMPUEXPO's publicist: "The reassertion of dominance by the big box-movers, the commodity companies, is forcing the entrepreneurs to differentiate by adding more value, through technical innovation and through service. The role of COMPUEXPO follows directly from those changes in the industry.

"COMPUEXPO is about two things—number one, providing a direct bridge, a technology source. The small guys want to have direct relationships with manufacturers in order to have the leading edge products and the most aggressive prices. So COMPUEXPO brings together the leading edge of the resellers and the system integrators with these direct sources of PC technology, as we call them, PC technology providers. That's the technology source part.

"The other part is to provide the exhibitors and the attendees, that is the resellers, with a marketing edge, in the form of value-added seminars and information, that can allow them to understand these trends, these changes, and compete more effectively in their local and regional market by emphasizing the strengths that they really have.

"End-users still want the best value for their PC. We're dealing with an increasingly educated end-user, who sees the issue as not just performance, or even price/performance, but value in the overall offering: the service, the strength of the company, and the other intangibles and tangibles that make that business partnership work."

Instead of emphasizing an endless round of product announcements, parties, and press conferences, COMPUEXPO fosters networking, information gathering, and deal-making on a global scale. As is appropriate to this mission, the event is very much a team effort, with an extensive list of cosponsors drawn from all segments of the industry: The ASCII Group, Inc., the largest group of independent computer resellers in the US and Canada, accounting for $3.2 billion in sales annually, will be having its annual meeting in conjunction with COMPUEXPO; the Taipei Hsien (THCA) and Taipei (TCA) Computer Associations, which together represent over forty-five hundred Taiwanese computer companies, provide manufacturing resources, technological innovation, and business partnerships. Another cosponsor is the National Business Information Association (NBI), a US-based manufacturer and reseller organization with two hundred supporting members; the Southern California Chinese Computer Association (SCCCA), and Computer Association of North America are large reseller organizations and also among the cosponsors. Additionally, sponsors among the trade press include The ASM Group (publisher of *Computer Sources, European Computer Sources,* and *Asian Sources Computer Products*), InfoWorld Publishing Company, and *Computer Technology Review*—not to mention *MicroTimes.*

Focused Information

In addition to hundreds of exhibitor booths, COMPUEXPO '93 will also feature specialized pavilions, offering entrepreneurs, vendors, and buyers information about key trends in the industry as they affect customers' needs—as COMPUEXPO Marketing and Public Relations Manager Susan Cooney puts it: "These are the products that people are going to be looking for—be aware. Get prepared for it, get involved."

Each showcasing the wares of dozens of exhibitors, the Chinese Software Application Pavilion, the THCA Pavilion, and the China Pavilion will provide information about overseas opportunities for products and business partnerships. A Pen Computing Pavilion will focus on handwriting-based products, a market that's expected to have explosive growth in 1994, and a series of related educational conferences will provide analysis of the technology, its applications, and potential user base.

Addressing a crucial trend is the Energy Efficient

The Energy Star Program

According to a bulletin of the Environmental Protection Agency, "Computers are the fastest-growing electricity load in the business world. They are believed to account for 5% of commercial electricity consumption—and if action is not taken, this could rise to 10% by the year 2000. Ironically, much of this electricity is wasted: research shows that the vast majority of time personal computers are on, they are not actively in use—and 30–40% are left running at night and on weekends."

Aside from contributing to whopping utility bills (both from the power consumption of the computers themselves and the additional costs of the air conditioning often required to counteract the heat they generate), this inefficiency has more far-reaching consequences: according to the same EPA bulletin, generating electricity accounts for 35% of US emissions of carbon dioxide, contributing to the greenhouse effect, not to mention 75% of sulfur dioxide and 38% of nitrogen emissions, a significant cause of acid rain.

energy
EPA POLLUTION PREVENTER

In an effort to create a pollution-reducing and money-saving alternative, the EPA has joined forces with many industry leaders to create the Energy Star program. Beginning in June of this year, member companies will offer computers and/or monitors that power down to 30 watts or less while not in use, thereby saving up to half of a computer's current energy consumption.

Already a number of electric utility companies have committed to the purchase of Energy Star equipment and encourage their customers to do likewise. Also, the federal government, which has agreed to reduce its energy consumption by the year 2000, has expressed strong interest in the program.

Based on present-day rates of consumption, the EPA says, "Energy Star Computers could save enough electricity each year to power Vermont and New Hampshire, cut electricity bills by $1 billion, and reduce CO_2 pollution equivalent to emissions from 2.5 million autos."

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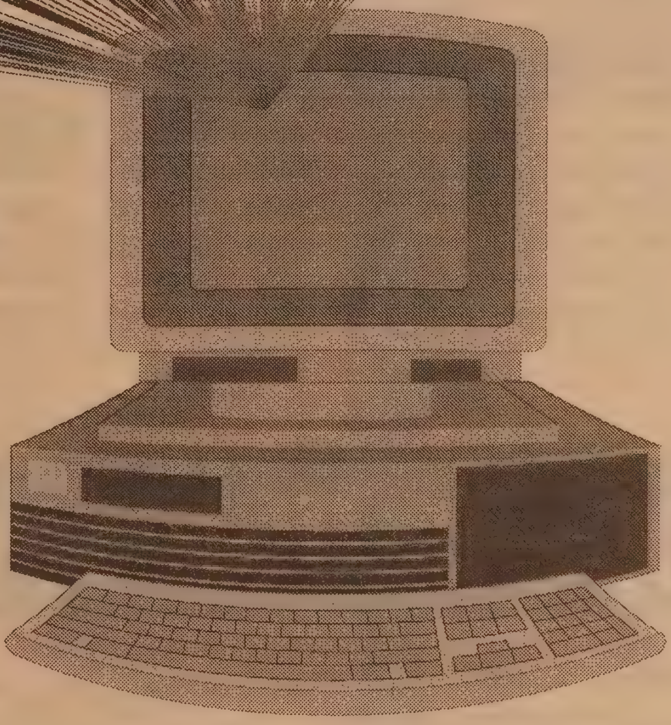

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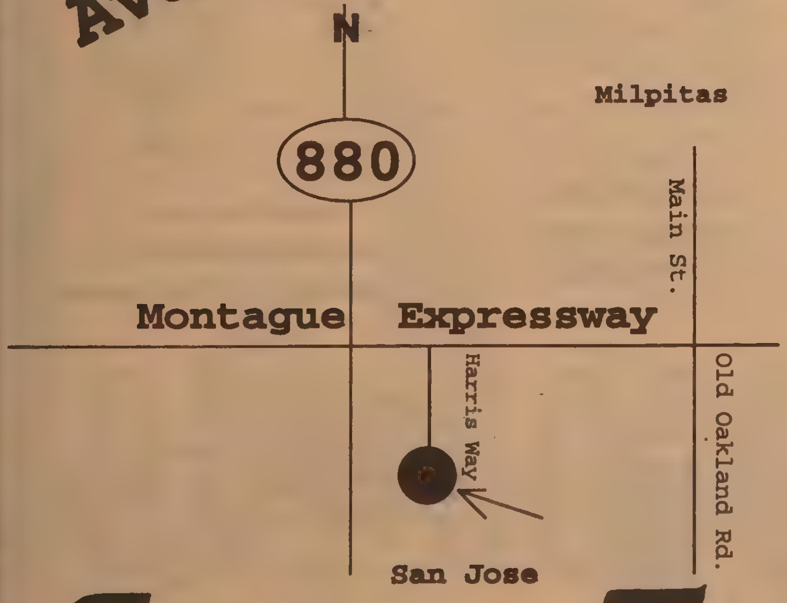

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Computer Technology Pavilion, a response to the Environmental Protection Agency's Energy Star program (see sidebar), featuring products that comply with the new EPA standards.

Says Yu: "The Fortune 200 companies often have more than ten thousand or twenty thousand PCs at a single site. If we can save 50% of the power of each PC, that's probably $100 for each PC a year; if you have twenty thousand, you can save $2 million per year in utility bills. Also you can save money on air conditioning to cool the building.

"Starting this June, a lot of computers will have power management built into the computer or the monitors, using the Energy Star logo. The state and federal governments and larger corporations will support this."

Adds Cooney: "It's a specific example of educating the buyers that are out there. Corporate buyers are going to be looking for energy-saving products in the '90s. They're going to be sourcing manufacturers who can provide this kind of equipment; other guys will be left in the dust."

Year-Round Team-Building

Given its mission of fostering alliances between a variety of independent players, COMPUEXPO has developed an additional service of offering a series of year-round free seminars to potential exhibitors and attendees, to allow them to make the best use of their time at the actual trade show. Subjects include the sort of industry-trend and marketing information that large corporations routinely pay for, which is usually beyond the reach of small vendors.

Explains Bentzel: "We're an all-year-round partnership-building enterprise. That's our mission, to build that bridge and to do that on an all-year-round basis. So unlike COMDEX, which allows a telemarketing person to call you once a year and ask you, "Do you want to renew your booth?", we're out there partnering with the leading trade publications and industry experts to bring information on technology trends, the reseller channel, the corporate marketplace, brand awareness, and all of the burning questions that small- to medium-sized companies cannot afford to overlook, but also often cannot afford to pay for on their own. We're providing that as part of our year-round service, in order to build up to the Expo itself, which we see as a networked marketing event for the new PC infrastructure."

Adds Cooney: "The seminars are one of the major partnering events where we're supporting our clients, not only the exhibitors but the attendees. We have newsletters that go out once a month, and offer networking and communications tools so our partners can communicate with each other, to see ourselves as part of the group. We want to sponsor events and publications so the networking can happen, so people can see the additional new resources that are available, new channels and new avenues to make new partnerships." (COMPUEXPO '93, UNSC Investment Group, 1-800-822-1229) ■

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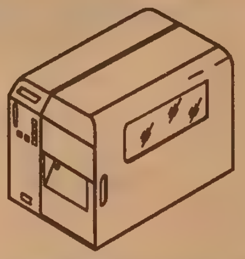

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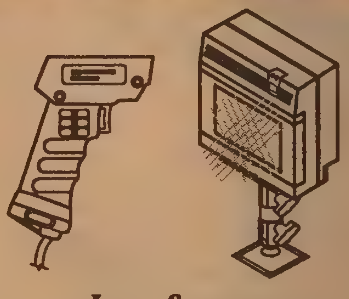

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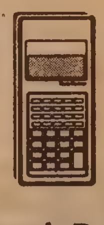

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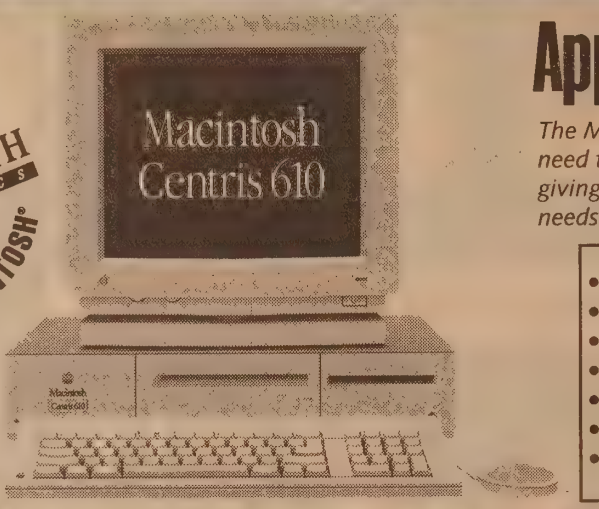

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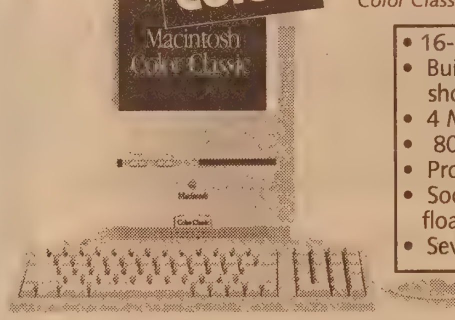

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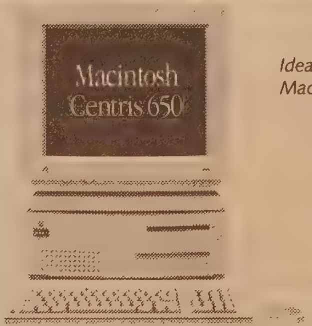

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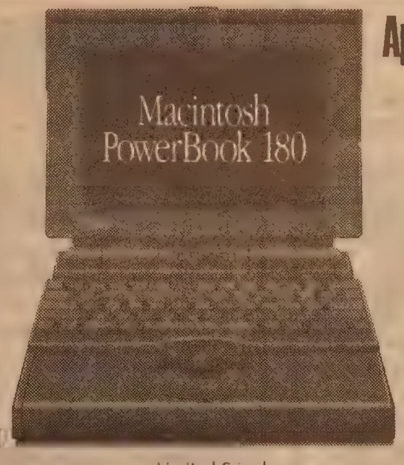

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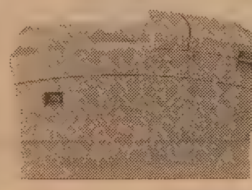

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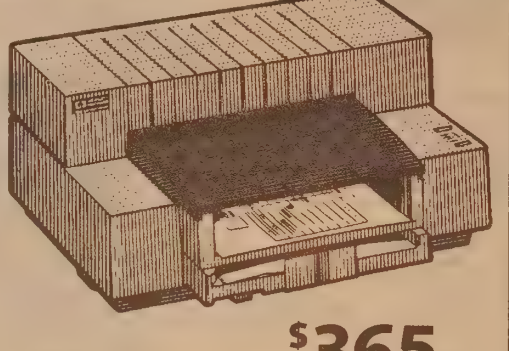

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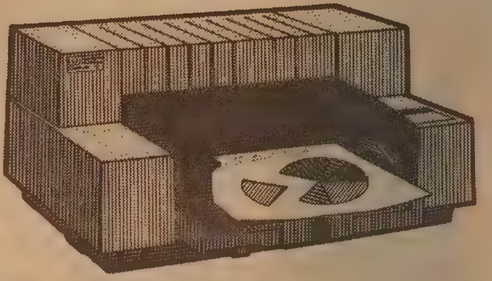

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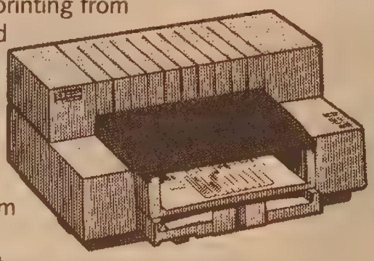

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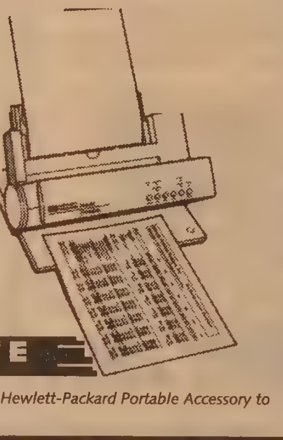

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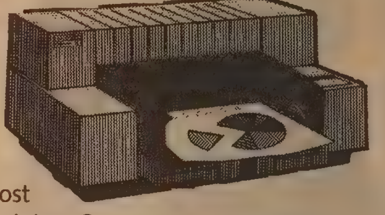

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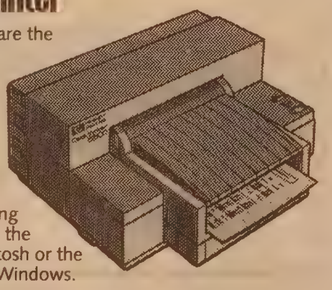

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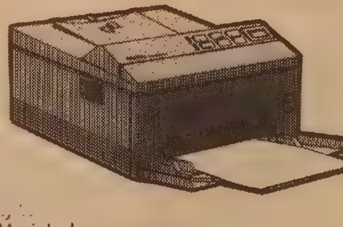

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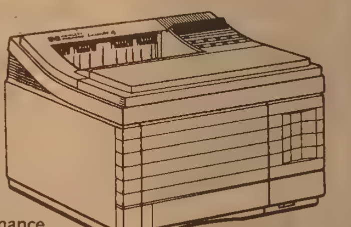

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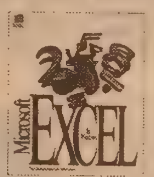

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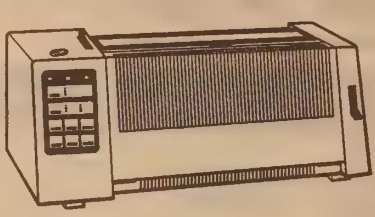

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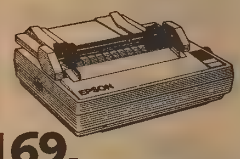

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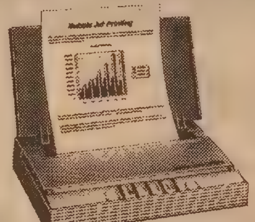

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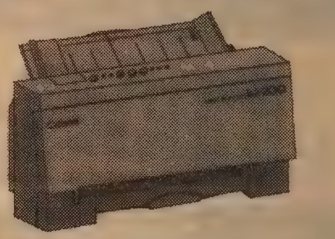

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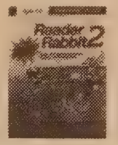

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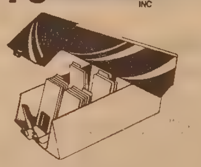

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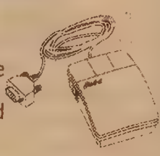

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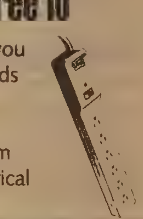

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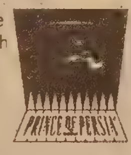

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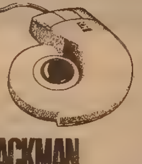

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Getting Precise About Ambiguity

BY BIRRELL WALSH

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What is fuzzy logic, anyway? The Japanese are using fuzzy logic to operate subways so smoothly that standing passengers don't have to hang onto the straps. Fuzzy logic autofocus systems for cameras don't hunt—they go smoothly to the best focus the first time.

Fuzzy logic is a system for being exact about inexact things. While probability is about uncertainty—what we don't know and have to guess about—fuzzy logic is about ambiguity. It is about how well a description fits: How accurate is it to say a football is a "ball"? If a business opportunity partially meets your criteria, how "interesting" is it? When you build fuzzy logic into computer systems, your applications can be efficient and subtle in an ambiguous world.

EXPERTISE MEANS UNDERSTANDING AMBIGUITY

Beginners tend to make absolute, black-and-white statements. When people get to know a field, they qualify and say, "Well, it depends..." a lot. Knowing a field means knowing all the degrees between absolutely yes and absolutely no. Mastery of ambiguity makes an expert.

When you try to turn expertise into an expert system, you have a problem converting the subtle, continuous knowledge of a human into the stair-step logic of a binary system.

It is just this conversion that fuzzy logic handles. The resulting systems can convert jerky mechanical controls into smooth governors that work without jitter and hunting. They can be used to efficiently encode the discoveries made by neural networks, without the overhead such a network requires. In the following example, a fuzzy system is used to make subtle rankings of business prospects.

EXCESS CAPACITY AT SANTA CLAUS ENTERPRISES

Santa's reindeer work hard one night a year. The rest of the time they stand around and eat hay. Santa is trying to raise productivity. He decides that he will offer goodwill visits for a flat ten million dollars a pop. You get Santa, the sleigh, and all the reindeer.

Response is so overwhelming that Santa must choose among hundreds of offers. He asks us at "Fuzzy Thinking International" to build a program to evaluate incoming requests. Here are his criteria:

"Well, if it's nearby, that's good. Especially if it's not off-season. Of course you have to look at both factors."

This is the sort of appoximate reasoning that a seasoned human expert does all the time. It is just the sort of reasoning that computers have not been comfortable with; the factors were all vague, too ambiguous for a yes-no system to handle well.

Fuzzy logic was developed to deal with ambiguities. "Nearby" is an ambiguous characteristic. If you are at the North Pole, Oslo at latitude 56° north is quite nearby. Miami (25° North) is not so nearby, and Melbourne (37° South) is definitely not nearby. While "Yes-No" logic would not be able to deal with the vagueness, a fuzzy logician has tools for the problem.

Ordinary logic has only two values for truth—"1" for completely true, and "0" for completely untrue. "Why waste all the values in between?" the fuzzy logician would say. Why not define an adjective like "nearby" as being shaded from true (Truth value 1.0) to false (truth value zero)? Then you can make a table like this for the adjective "nearby":

"Definitely nearby"	**1.00**
"Pretty nearby"	**.75**
"Neither nearby, nor not..."	**.50**
"Pretty much not nearby"	**.25**
"Not nearby at all"	**0.00**

There are two advantages to this fuzzy-logic approach. The shades of gray in the world are respected, and the problem becomes one that a computer can work with. (The underlying theory was developed at the University of California, Berkeley—one reason why universities are worth your tax dollars.)

USING CUBICALC

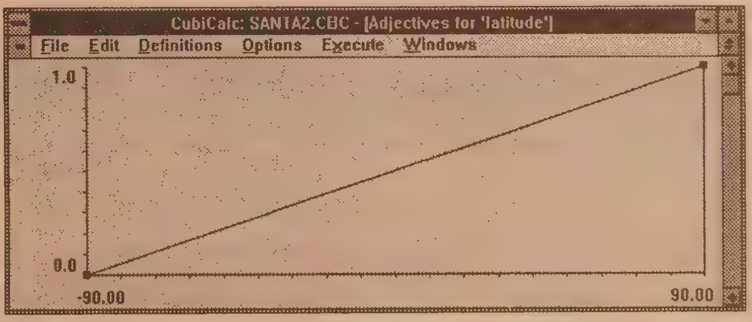
CubiCalc is a Windows program that turns this theory into a technology you can apply to daily problems. We applied it to the Claus Enterprises problem.

When we spoke with Santa, he said that he had two priorities:

- **Visits are better if they are nearby**
- **Visits are better if they are off season**

How can Santa combine these criteria to prioritize the visits? This is a perfect case for fuzzy analysis, and we coded it into CubiCalc.

First we created the variables "season", "latitude" and "priority". The first two are input variables, and the latter is the output variable we are trying to calculate. Then we defined adjectives for the variables: "off-season" for the variable season, "nearby" for the variable latitude; and "high" and "low" for the output variable priority.



"Some fuzzy adjectives like 'latitude' have a straightforward definition."

Santa's definition of the adjective "nearby" for latitude is relatively straightforward: The North Pole is completely nearby (value 1.0), the South Pole is completely not nearby (value 0.0), and the equator is halfway in between (value .5). The adjective "nearby" is a straightline function of latitude values.

Santa's definition of the adjective "off-season" for the variable "season" is not straightforward. He said, "We are really busy from November 1 to the end of January. We slowly start getting ready around the first of September. And we don't have everything put away and the next season's plans made until April 1. And then there is the trade show on Bastille Day..."

Further conversation clarifies that anything from November 1 to the end of January, and

continued on page 225

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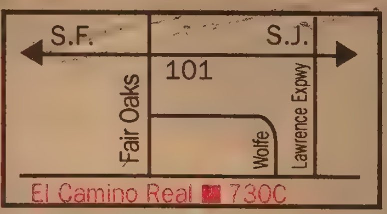

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- Tower or Desktop case w/power supply
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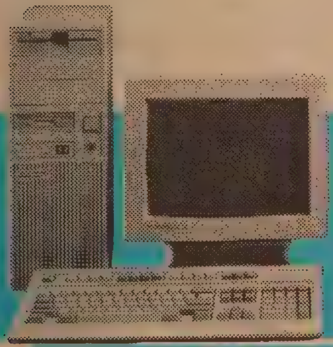

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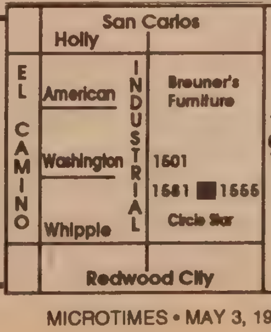

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	16 MB	310-2469	649
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T3300SL	1/2 MB	99/129
T3100	2 MB	109
T2200SX, SXE, T1000LE	2/4/8MB	105/157/279
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Altima LSX	2/4 MB	165/249
Avanti	2/4 MB	74/145
AST Premium Exec	1/4 MB	75/134
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Compaq Contura Lite 20/25	2/4/8 MB	105/155/295
Chaplet Notebook	2/4 MB	155/249
Chicony 386SX	4 MB	189
Chicony 386SL/25	2/4 MB	129/229
DECPC 320P	2/4/6 MB	195/269/389
DELL 320N &212N	1/2 MB	85/125
DELL 320N, NC	2 MB	125
DELL 325N, NC	2 MB	179
DELL NL25, NL20	2 MB	179
Epson NBS3	1/4 MB	98/225
Everex Tempo LX	2 MB	88
HP 95LX	1/2 MB	159/279
IBM L40SX, N33/SX	2/4/8 MB	99/155/299
IBM N51SX & SLC	1/4/8 MB	99/155/299
IBM PS/2 N45 Sl	2 MB	179
MAC PB 160, 180	6/10 MB	249/425
MAC PB 140, 170	2/4/6 MB	89/175/229
MAC PB 100	2/4/6 MB	89/179/239
Magnavox Metalis 386SX	4 MB	199
NEC Ultralite 286F	1/4 MB	99/199
Packard Bell 386SX	1/4 MB	99/229
Panasonic CF 170/270/370	1/2 MB	65/99
Sharp PC 8501	2 MB	105
Sharp 678/6881	2 MB	129
Sampo NB SX/26, SX/25	2/4 MB	145/225
TI Travelmate 2000	1 MB	77
TI Travelmate 3000	2 MB	69
TI Travelmate 4000	4 MB	219
Zenith Turbosport 386 E	1/4 MB	95/299
Zenith Supersport SX	2 MB	145
Zenith Mastersport	2 MB	99

IBM PS/2 & PS/1 MEMORY

PS/1 286/386SX	2/4 MB	$95/149
PS/1 Consultant		
Essential/Expert	1/2/4/8 MB	45/79/155/299
386 Valuepoint	2/4/8 MB	89/159/305
486 Valuepoint	4/16 MB	169/595
PS/2 30-286	2 MB	89
50Z, 55SX, 65SX, 70	2/4 MB	79/145
40SX, 35SX,35SL	2/4 MB	79/149
70A21, A61, 121	2 MB	109
80-11, 121, 311	4 MB	210
95,90,P75, PS/1 Pro	2/4/8 MB	110/149/305
16 Bit Exp Bd For 50, 50Z, 60, 65SX	0K	144
32 Bit Exp Board for all 70 & 80 models	0K	164
RISC 6000	16/32/64 MB	745/1490/2890
Other Models		CALL

AST MEMORY

Bravo 3/33(LC) 325S	2/8 MB	$84/299
Bravo 486/25 & 4/33	2/8 MB	109/309
Bravo 486LC	4/8/16 MB	145/295/565
Cupid-32 Board	0K	219
Premium 386C	4 MB	145
Premium SE 450	4 MB	145
Premium 386/25, SX,33,486/25	1 MB	40
Premium II 386, 486	1/4 MB	37/145
Executive Notebook	4 MB	134
Other Models		CALL

SUN MEMORY

SPARC SLC	4 MB	$145
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SPARC 10	16/64 MB	645/CALL
SUN Classic	16 MB	625
SPARC Server 630np	64 MB	2285
SUN IPX, ELC	4/16 MB	175/555
SPARC II	16 MB	560
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BASIC SYSTEM CONFIGURATION: Motherboard & CPU, 1MB memory installed, 1:1 2HD/2FD controller, 1.2 or 1.4 floppy drive, internal clock (Calander, Enhance Case or Mini Tower case with Power supply, and 101 Enhanced keyboard).

SYSTEM	Motherboard & CPU	BASIC system
486DX2-66/256 EISA VESA	$757	$915
486DX-50/256 EISA VESA	$630	$864
486DX-33/256 EISA VESA	$518	$676
486DX2-66/64K ISA	$611	$767
486DX-50/64K ISA	$523	$681
486DX-33/64K ISA	$379	$535
386DX-40/64K ISA	$140	$299
486DLC-33/64K ISA	$279	$435

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- * 1024x768 .28DP 14" SVGA Monitor
- * 512K SVGA Card
- * 101 Enhanced Keyboard
- * Enhanced Case w/230 Watt Power Supply
- * Microsoft Compatible Mouse
- * Mouse Pad

486 DX2-66/128K VESA LOCAL BUS	$1411
486 DX2-50/128K VESA LOCAL BUS	1319
486 DX2-33/128K VESA LOCAL BUS	1178
486 DX2-66/256K EISA VESA	1585
486 DX-50/256K EISA VESA	1485
486 DX-33/256K EISA VESA	1335
486 DX2-66/64K ISA	1371
486 DX-50/64K ISA	1300
486 DX-33/64K ISA	1139
386 40/64K CACHE	897
486 DLC-33/64K CACHE	1039

OPTIONS

-KFC Non-Int	add $30
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-LocalBus SPiDER	70
-Luminar 24Bits 1MB, 16M colors	35
-Trident 1MB	20
-170MB Hard Drive	30
-200MB Hard Drive	90

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FARENHEIT
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170mb/16ms (IDE) Conner CP30124	227
213mb (IDE) Maxtor 2213AT	294
240mb/16ms (IDE) Maxtor	295
240mb/15ms (IDE) Quantum LPS240	325
250mb/15ms (IDE) Conner	290
340mb/13ms (IDE) Maxtor LXT340AT	438
500mb/13ms (IDE)	755
1.2 GB - 13ms	1,180

MULTIMEDIA

Chinon CD-ROM	$429
Mitsumi CD ROM w/Card (350ms)	219
NEC CD ROM 84M (280ms)	519
SONY CD ROM CDU 31/541	308/414
Creative Lab. CD ROM &Sound card	400
Creative Lab Soundblaster	95
Creative Lab Soundblaster Pro w/MIDI	179
MEDIAVISION Pro 16 CDROM&Sound	919
MEDIAVISION ProAudio Spectrum	184
MEDIAVISION ProAudio plus	150
TOSHIBA CDROM 3401 w/Card (200ms)	490
Sound Blaster Pro/MIDI Kit	177
SoundBlaster basic	83

RAM&MATH COPROCESSORS

*4MB-70 Simm	$125
*4MB-80 Simm	120
*1MB-60	35
*1MB-70	30
*1MB-80	29
*387SX-20/25	30/35
*387DX-33/25/20/16	60/55/45/35

VIDEO CARDS

Trident VGA-521 (1024x768,16 bit)	$36
Trident 1MB (1024x768,16 bit)	58
Video 7 VRAM II/1MB	338
Diamond SpeedStar 24X w/Hi color w/1MB	140
Dianmond Stealth w/Hicolor w/1MB	152
Diamond Stealth 24VESA Local bus w/1MB	169
Diamond Stealth Pro VRAM w/2MB	403
Diamond Viper VESA Localbus w/2MB	418
SPiDER 32VESA Local Bus	125
Luminar 24BITS 16M colors	90
Orchid Farenheit 1280Plus w/1MB	144
Orchid Farenheit Localbus w/1MB	169
Orchid Prodesigner IIs	115
Orchid P9000 VESA Localbus w/3MB	428
ATI Graphic Ultra plus w/2MB	288
ATI Graphic Ultra Pro w/1MB	304
ATI Graphic Ultra Pro VLB w/2MB	418

MONITORS

Nanao F550i (17",1280x1024,0.28)	$1,018
Nanao F560i (17",1280x1024,0.26)	1,673
NEC 3FGX/ 4FG	605/710
NEC 5FG OEM/5FGE	1,286/1,199
MAG 15F (1280x1024,0.28)	546
MAG 17F (1280x1024,0.26)	1,026
SONY CPD 1304s/1430	529/584
SONY CPD 1604s (17",1024x768,0.25)	939
HITACHI CM-2085(20")/2187 (21")	249/149
Super VGA (1024x768) monitor 0.28	241
Super VGA Non-interlaced Monitor 0.28	266
Viewsonic 4E/5E/5+	275/374/476
Viewsonic 6E/6FS/15	315/525/634
Viewsonic 7/8	947/1,504

CONTROLLER CARDS

IDE 2FD/2HD	$14
IDE 4FD/2HD	35
IDE cache controller (promise)	110
VESA Localbus IDE	54
IO with 2s/1p/1g	12
Monochrome card	12
Adaptec SCSI 1522/1542B	98/228
Adaptec 1542BK+/1742EISA	305/405
TECO VESA IDE Cache	240

KEYBOARDS

101 Enhanced keyboard	$21
Maxiswitch	31
Keytronics	36
Focus 2001/5001	38/55
Omnikey 102/Ultra	66/89

MISCELLANEOUS

Internal Modem 2400 Baud	$30
Fax Modem (9600 F, 2400 M)/Window	50/57
Fax Modem (14400 F, 14400 M)	175
3-Button mouse	11
Microsoft mouse	60
Logitech Mouseman serial (4000dpi)	60
Logitech Mouseman Bus (4000dpi)	60
Colorado Tape backup DJ-10 120M	165
Colorado Tape backup DJ-20 250M	209
Colorado Trakker 250MB	394
IOMEGA 250MB Tapebackup	260
Baby AT/Mini Tower case w/230W PS	57
Medium Tower case 2/230W PS	90
Full Tower case w/230W PS	100
Microsoft DOS 6.0/Windows 3.1	45/40

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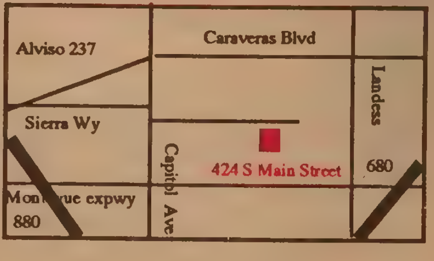

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ON ALL
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486-33 MHz W/64K CACHE

- 4 Mb RAM installed
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- 1:1 Interleave 2 HD/FD Controller
- AT Multi I/O (2S/1P/1G)
- Clock/Calendar with battery back-up
- Enhanced 101 Keyboard
- 120 Mb IDE Hard Drive
- SVGA Monitor w/Card (1024x768 .28Dp)
- MS-DOS 5.0

$1350

386-33 MHz W/64K CACHE

- 4 Mb RAM
- 8 Slots and Socket for Intel 80387 DX
- 200W Approved Power Supply
- Real Time Clock with Battery backup
- 2 Serial, 1 Parallel, 1 Game Port
- 101 Enhanced Keyboard
- 1.2 and 1.44 Mb Floppy Drive
- 120 Mb IDE Hard Drive
- 1:1 Interleave 2 HD/FD Controller
- SVGA Monitor w/Card (1024x768 .28Dp)
- MS-DOS 5.0

$1050

386 SX 25 MHz

- 0 Wait State on Motherboard
- Main Memory 2 Mb
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- 101 Enhanced Keyboard
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- SVGA Monitor w/Card (1024x768)
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SCSI 1:1 HD/FD Cont	$99
DTC 7287 RLL Cont	$80
Orchid Pro Designer w/1 Mb	$180
Paradise VGA Card	$70
VGA Card w/256K	$40
Oak VGA Card w/512K	$58
Trident SVGA w/1 Mb	$70
Everex Ram 3000 Expansion Card	$90
Everex Ram 10K Expansion Card	$150

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Baby AT w/200W Power	$70
Baby Tower w/200W Power	$70
Mid Tower w/220W Power	$110
Full Tower w/250W Power	$160
165W (XT) Power Supply	$45
200W Power Supply	$60
230W Power Supply	$60

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Frame for 3.5″ Hard & Floppy Drive	$5
CONNER	
CP-3000 40Mb IDE	$160
CP-30084 80Mb IDE	$200
CP-30104 120Mb 19ms IDE	$220
CP-30204 200Mb 16ms IDE	$310
MAXTOR	
LXT-7080A 80Mb 19ms IDE	$200
LXT-7120A 130Mb 15ms IDE	$220
LXT213A 212Mb 16ms IDE	$310
LXT340 340Mb 13ms IDE	$Call
SEAGATE	
ST-351A 40Mb 28ms IDE	$150
ST-3120 100Mb IDE	$Call
ST-1239A 211Mb 15ms IDE	$Call
TEAC	
360K 5.25″	$60
720K 3.5″	$60
1.2Mb 5.25″	$60
1.44Mb 3.5″	$60

INTEL MATH CO-PROCESSORS

80287-10 For 286 Systems	$40
387 SX-16	$115
387 DX-20	$99
387 DX-25	$99
387 DX-33	$99

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DRAM	
1Mb x1-8	$4.50
256K -8/10	$1.25
256K x4-8	$4.50
64K -10	$1
SIMM	
4Mb x9-7	$135
1Mb x9-7/8	$40
1Mb x3-7/8	$35
SIPP	
1Mb x9-8	$40
256K x9-8	$12

MODEMS

Everex 2400Baud Internal	$75
Everex 2400Baud Int. w/MNP5	$150
Everex 2400Baud External	$175
Everex 2400Baud Ext. w/MNP5	$195
USRobotic 9600Baud Internal	$290
USRobotic 9600Baud External	$320

MONITORS

NEC 3FG	$649
NEC 4FG	$749
Sony 1304 SVGA	$579
14″ Monochrome	$105
SVGA Monitor 1024x768 .28 dp	$275
SVGA Monitor 1024x768 .39 dp	$240
Viewsonic 6	$345
Viewsonic 7	$Call
14″ Monochrome VGA	$125
Relisys 14″ SVGA Non-Int	$310
ST 14″ SVGA Non-Int (428-VESA)	$330

MOTHERBOARDS

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286 12MHz Motherboard	$85
386 SX 25MHz Motherboard	$120
386 DX 33MHz Motherboard	$220
386 DX 40MHz Motherboard	$230
486 DX 33MHz Motherboard	$495
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PRINTERS

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Citizen Color Upgrade Kit	$49
Panasonic 2180 (9 Pin)	$189
Panasonic 2123 (24 Pin)	$245
Panasonic 2124 (24 Pin)	$319
Panasonic 4410 Laser	$629
Panasonic 4450 Laser	$Call
Toner KX-P450	$37
Toner KX-P451	$39⁹⁵
Toner KX-P453	$35⁹⁵
HP 51604A	$11⁹⁵
HP 51608A	$19⁹⁵
HP 92261A	$11⁹⁵
HP 92275A	$69
HP 92295A	$83

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Colorado 120Mb/250Mb	$160/230
External Kit for Colorado Drive	$110

TRACKMAN

Logitech Trackball	$85
Logitech Serial Mouseman	$70
Microsoft Bus Mouse	$90
Microsoft Serial Mouse	$85
DEXXA Mouse w/Windows 3.1	$75
DEXXA Mouse	$27
Summasketch II	$299
Mouse Systems A3 Mouse for Mac	$75
Mouse Systems A3 Trackball for Mac	$75
Mouse Systems Page Brush/Color Scanner for Mac	$600

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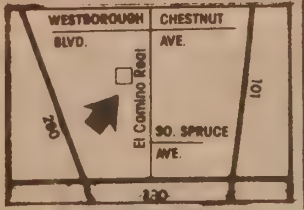

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- IDE 2FD/2HD Controller
- 101 Key Mitsumi Keyboard
- Teac 1.2 or 1.44 MB Floppy Drive
- 2 Serial, 1 Parallel, 1 Game Ports
- Mini-Desk Top or Tower Case
- Power Supply
- One Year Warranty

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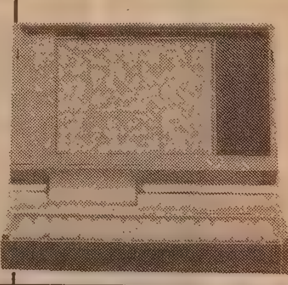

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200 MB	$1518	$1768

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Diamond Speedstar-24X Windows Accelerator 1280x1024 1 MB 16 Million Colors	158
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Diamond Stealth Pro (VRAM) 1/2 MB	249/359
Diamond Viper 2MB VRAM	395
ORCHID FAHRENHEIT DRAM	$168
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GENOA VESA LOCAL BUS	108
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TRIDENT VGA (1024x768) 1 MB	$58
Accumos VGA 800x600/256K	$28
Accumos 1024x768/512K	39
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DTC 2290 EISA IDE FD/HD	135
IDE Controller	20
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IDE I/O VLB (2S/1P)	49
Adaptec SCSI 1542C w/Software	219/259
Adaptec SCSI 1742A EISA w/Floppy & Software	428
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Ultrastor VLB SCSI II 32K Cache	288

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AT I/O (2S 16550/1P/1G)	$42
RS-232 card	17
AT-I/O (2S/1P/1G)	20
Printer Card	14
Game Card	14

MONITORS

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F550i 17″	$1125
T560i 17″	1645
T660i 20″	2595
KFC 17″ Flat Screen .26	835
STANDARD 17″ 1024x768 .31	545
VIEW SONIC V8	1595
V7 17″ Flat Screen (72Hz Non-Int)	995
V6E Non-Int 14″	355
V5E	415
V6FS 15″	549
V4E 1024x768 VGA 14″	315
EYEQ 1024x768 VGA .28I	268
SVGA 1024x768 (OEM Goldstar).39	225
TOUCH NI 1024x768 (OEM Goldstar)	288
STANDARD TECHNOLOGIES 1024x768 .28 w/Oversizing	275
VGA Mono	109
NEC 4FG	748
3FGX	648
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SONY 1304 Non-Int (1024x768) 14″	565
1604S 16″	995
2036 20″	2095
MAG MX 15F .28 1280x1024 NI	585
MAG MX 17F .26 1280x1024 NI	1075

KEYBOARDS

Keytronic 101	$39
Mitsumi 101	33
Chicony 5161 101 Keyboard (clicking)	39
MAXISWITCH 101 Keyboard	39
Omni 102/Ultra	69/95
Black 101 Keyboard	39

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14400 Fax Modem V.42 Int/Ext	178/215

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1.2, 1.44 MB Combo Drive	135

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130 MB 15ms (64K Cache)	199
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7245A 240 MB	305
7345A (new) 340 MB	459
LXT 340S (SCSI II)	569
LXT-5335	928
LXT-535A 535 MB	878
1.2 Gigabyte 13ms	1128
1.7 Gigabyte 13ms	1428
CONNER	
80 MB	178
120 MB 19ms	199
170 MB 17ms	228
213 MB 12ms	308
250 MB	318
540 MB	889
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877 MB SCSI II 3.5″	949
1.2 GB SCSI II 3.5″	1199

NETWORK CARDS

Ethernet 8 Bit	$75
Ethernet 16 Bit	89
Arcnet Star/Bus 8 Bit	49
10 BT Ethernet 16/8 Bit	99/85

TAPE BACK-UP

COLORADO Tape Back-Up 120 MB	$149
Tape Back-Up 250 MB	205
DC-2120 Tape Cartridge For Above	18^{50}
COLORADO Drive External Kit	109
COLORADO Trakker 250 MB	CALL

HIGH QUALITY MAIN BOARDS

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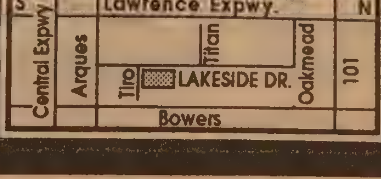

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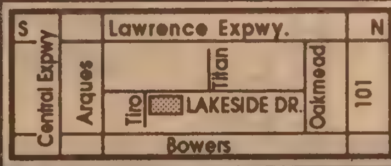

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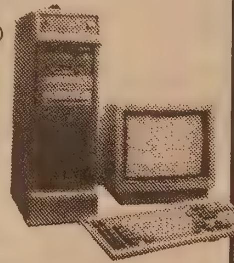

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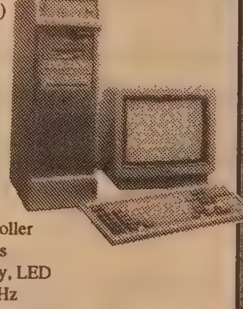

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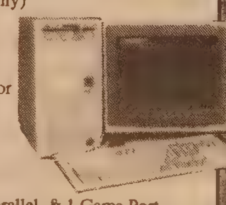

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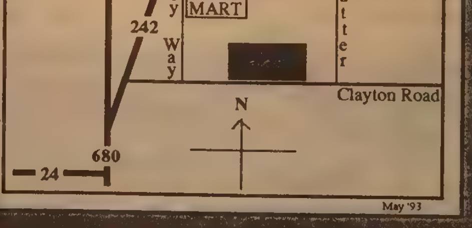

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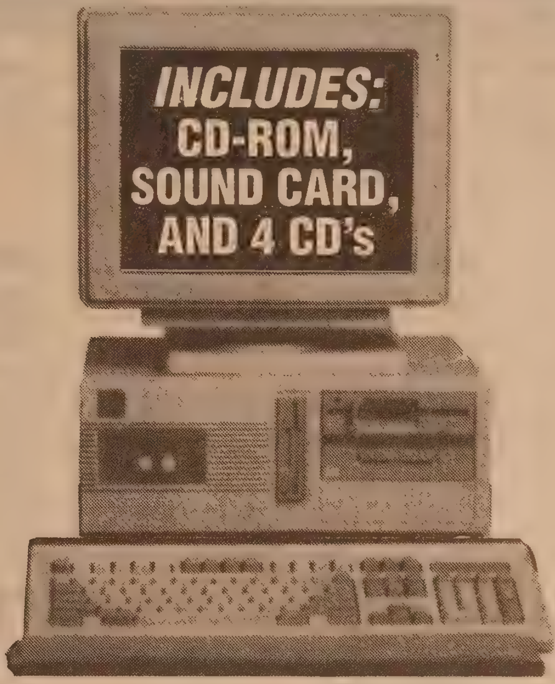

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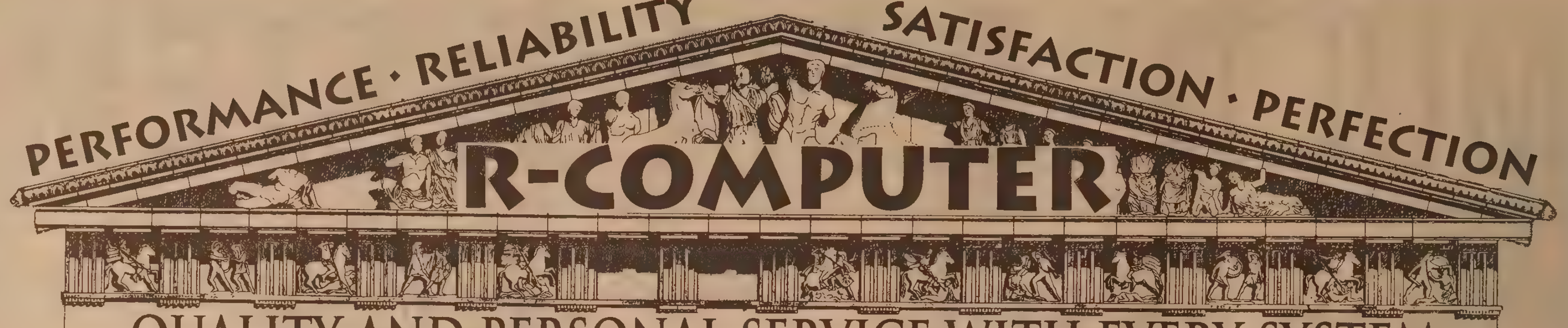

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- TEXXEL CD ROM (300KB SEC/265MS)
- STEREO SPEAKERS

COMPLETE SYSTEM WITH DELUXE CASE AND KEYBOARD

$2063

486-25
130MB HARD DRIVE SVGA SYSTEM

- 486-25MHZ CPU
- 4MB RAM
- 130MB MAXTOR HARD DRIVE
- VIEWSONIC SVGA MONITOR
- SVGA CARD
- 1.2 & 1.44MB FLOPPY DRIVE

COMPLETE SYSTEM WITH DELUXE CASE AND KEYBOARD

$1394

386SX-25
80MB HARD DRIVE VGA SYSTEM

- 386SX-25MHZ CPU
- 1MB RAM
- 80MB MAXTOR HARD DRIVE
- VGA MONO MONITOR
- 1.2 OR 1.44MB FLOPPY DRIVE

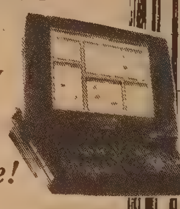
COMPLETE SYSTEM WITH DELUXE CASE AND KEYBOARD

$789

BCC NOTEBOOKS

AVANTI 486 SLC

- 486SLC/25 MHZ PROCESSOR
- 80MB HARD DRIVE
- DOS
- HIGH CONTRAST 10" DISPLAY



$1795

Color Model Available!

$2295

intel inside

VIEWSONIC MONITORS

VIEWSONIC 1	$240
VIEWSONIC 4	305
VIEWSONIC 6	355
VIEWSONIC 5E	410
VIEWSONIC 6FS	595
VIEWSONIC V7	995
MAG17F	1140
VIEWSONIC V8	1580
VIEWSONIC 15	665
17	1195
20	1840

VIDEO GRAPHICS

ALLCUMOS 256K	$34
TRIDENT 9000	45
TRIDENT 8900	65
DIAMOND SPEEDSTAR 24X	169
DIAMOND SPEEDSTAR 24	149
ORCHID PRO IIS	140
DIAMOND STEALTH	179
FAHRENHEIT 1280	179

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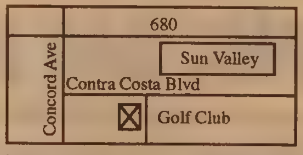

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LANtastic by ARTISOFT

LAN TIMES READERS CHOICE 1992

LAN MAGAZINE 1992 PRODUCTS OF THE YEAR

PC MAGAZINE EDITORS' CHOICE
April 14 1992
LANtastic, Version 4.10

ASA COMPUTERS, INC

[408] 496-6853

Also check later in this Ad for the store closest to you.

This is a sample chart to help you configure systems.

Look at our other pages for more peripherals.

SYSTEM CACHE 64K on all DX MBs $25 more for 256K	Basic System M/B, 1MB mini tower IDE/2SPG 1.44 FDD 101 K/B	Basic System +40MB ide 14" mono Mon MGP Card	Basic System +40MB ide 13" vga Color VGA Card	Basic System +80MB ide 14" SVGA .39 SVGA 512 Card Total 4MB	Basic System +120MB ide 14" SVGA .28 SVGA 1MB Card Total 4MB +1.2 Floppy	Basic System +200MB ide 14" NI SVGA .28 SVGA 1MB Card Total 8MB +1.2 Floppy	Basic System +340MB ide 14" NI SVGA .28 SVGA 1MB Card Total 8MB +1.2 Floppy	Basic System +340MB ide 14" NI SVGA .28 SVGA 1MB Card Total 8MB +1.2 Floppy SONY CDROM *
486DX2-66 VLB	$839	Corporate Buyers				$1,714	$1,866	$1,991
486DX-50 VLB	$762	48 hrs On-Site plan available			$1,419	$1,637	$1,789	$1,914
486DX-33 VLB	$608				$1,265	$1,483	$1,635	$1,760
486DX2-66 EISA	$927				$1,584	$1,802	$1,954	$2,079
486DX-50 EISA	$844				$1,501	$1,719	$1,871	$1,996
486DX-33 EISA	$690				$1,347	$1,565	$1,717	$1,842
486DX2-66 ISA	$778		$1,046	$1,298	$1,435	$1,653	$1,805	$1,930
486DX-50 ISA	$696		$963	$1,215	$1,353	$1,571	$1,723	$1,848
486DX-33 ISA	$542	$752	$809	$1,061	$1,199	$1,417	$1,569	$1,694
486SX-25 VLB	$404	$614	$672	$924	$1,061	$1,279	$1,431	$1,556
386DX-40 ISA	$304	$514	$572	$823	$961	$1,179		
386SX-33 ISA	$252	$462	$520	$772	$909	$1,128		
286-20 ISA	$216	$426	$484	$735	$873	Free mouse w/ all systems		

This Matrix is updated frequently, please give us a call and we will fax you the latest version

VAR's and reseller's call for our reseller matrix.

All Basic Configurations [systems] include Motherboard, 1MB RAM, Mini Tower Case, IDE [1:1] Controller, 2SPG, 1.4 Floppy, 101 Keyboard

All ASA build systems have an in-house system warranty of three years. Parts Warranty is 1 year. * While quantities last

......................TOP OF THE LINE LOCAL BUS GRAPHICS/CAD WORKSTATIONS..........

SPECS	DIAMOND	ATI	ORCHID	NUMBER NINE	MUSTANG
Motherboard	DIAMOND FASTBUS	MICRONICS MX-30	ORCHID	ORCHID	MUSTANG**
Power	486-66 256K CACHE	486-66 256K CACHE	486-66 256K CACHE	486-66 256K CACHE	486-66 256K CACHE
Video Power* [max]	50 winmark	26 winmark	50 winmark	42 winmark	50 winmark
RAM	8MB-70 exp to 128MB	8MB-70 exp to 64MB	8MB-70 exp to 32MB	8MB-70 exp to 32MB	8MB-70 EXP TO 32
BIOS	DIAMOND	PHOENIX	AMI	AMI	AMI
Exp. Slots	2 VESA, 5 ISA	2 VESA, 6 ISA	2 VESA, 6 ISA	2 VESA, 6 ISA	2 VESA, 6 ISA
Floppy Drives	1.2, 1.44 Teac Drives	Same	Same	Same	Same
HFC	On-Brd 16 bit dsbld	32 bit orchid VLB	32 bit orchid VLB	32 bit orchid VLB	Mustang vlb 32b ideio
	32 bit orchid VLB	NA			
Case	Med Tower 230 PS	Same	Same	Same	Same
Keyboard	Keytronic E500	Same	Same	Same	Same
Video Card	DIAMOND-VIPER	ATI-ULTRA PRO	ORCHID CELSIUS 9000	LEVEL 11	DIAMOND VIPER
Special Features		PENTIUM UPGRD		Virtual Rsltn upto 2048x1024 on	PENTIUM UPGRD
	2MB VRAM	2MB VRAM	2MB VRAM	any mntr —2MB VRAM (optnl 3MB)	2MB VRAM
	1280X1024X256Clr 74Hz NI	Same	Same	Same	Same
	1024x768x66KClr, 76Hz NI	Same	Same	1024x768x66KClr, 100Hz NI	Same
32bit Proc	WEITEK P9000	MACH32	WEITEK P9000	S3 928 GUI Accelerator	WEITEK P9000
Video Mnfr #	408-736-2000	416-756-0711	510-683-0300	617-674-0009	408-736-2000
Price	$1,818	$1,717	$1,717	$1,878	$1,646

All CPUs have a cooling fan with heat sink. * PC magazine 2.5 **Intel Pentium 586 Compatible

Coupon Coupon Coupon

Hottest CD and Sound Card
TOSHIBA 3401B Int w/Pro Audio Spectrum 16, 200ms,330kb/sec, 256 cache buffer, CD Photo multi session,XA, SCSI-2 PA16 Card, Caddy,w/Speakers
.........................$589

Sound Card
Sound Blaster Compatible 8bit, All you need for your PC
...........................$55

.........No Returns......Validupto 04/17/93................

Summer School Multi-media Kit/Bundle
350msec CD-ROM,Sound Blaster Comp Card,Cont. Card,Cables/7p CD's
.................$279/$89w/Kit

US Robotics
14400 Modem w/Fax Int/Ext
TYIN National Semi Voice Mail Mod/Fax
Int /Ext /Tyin
............$199/$189/$169

.......Cash or Company Check only................
.......One Coupon per Customer.....................

Coupon Coupon Coupon

15" Monitors
1280 x1024, .28dot pitch ,N0n Inter
Mitac/MAG 15F
............................$399/549

20" Monitors
1280 x1024, .31dot pitch ,Non Inter
Magnavox/SAMPO
.....................$1179/969

......Available at Participating ASA Stores only.........
.........Not valid with any other promotion..............

17" Monitors
MAG 17F 1280, .26 Mp
Sampo 1766B 1280, .31
Toshiba cu01 1024, .31
..............$975/675/649

877MB/1.2GB HDD
Toshiba 877MB,12.5ms,3.5"
.....................$949
Toshiba 1.2GB,12ms.35"
.......................$1159

.............Walk in Service only...........
.........Limited Stock...........

Coupon Coupon Coupon

1.2GB/1.7GB HDD
Seagate 1.2GB,FH,14ms,5.25
..........................$1065
Maxtor 1.7GB,FH,13ms,5.25"
............................$1259

520MB/340MB HDD
Fujitsu 520 IDE,SCSI,12ms....
..5yrs...................$749
WD 340 IDE 12ms.....$404

....Walk in Service only.....
.....Demo..............................

TURN PAGE FOR 2 MORE PAGES OF ASA COMPUTERS ADS

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Continental USA
Corporations please enquire when ordering full systems.

14" TERMINAL
LAN READY -VGA

(Incl. Monitor and K/B)

$369.00

LOCAL BUS

MOTHERBOARDS

(Many of our new M/Bs have Pentium Socket)

Mustang 486SX-25 ..(upgrdbl)	$265
Mustang486-33/50/60 w/256k	$453/610/694
Mustang VLB ·EISA/VESA..PENTIUM READY... ....486-33/50/60 w/256k	$739/896/975
Mustang VLB..PENTIUM READY ...486-33/50/60 w/256k	$719/876/955
ORCHID 486-33/50/66-256	$545/700/785
DiamondFstbs 33/50/66.w/idelo	$635/790/875
Micronix 486-33/50/66	$735/868/980

CONTROLLERS

DTC 2270 8.3MB/sec IDE / IO	$81
Mustang IDE/IO	$52
ORCHID IDE/IO vlb	$68
Mustang IDE/IO Cach15.6mb/sec	$198
UltraStor SCSI 34F, 32k Card..10mb/sec.	$269
UltraStor SCSI 34F, 32k Kit	$329

GRAPHIC ADAPTERS

(wm = winmark ver2.5)

DIAMOND Stealth 24vlb S3-805.1mbdram	$164
DIAMOND Stealth pro 1/2MB ram,36wm	$265/340
DIAMOND Viper 1/2MB,9000,50wm	$330/405
ORCHID Fahrenheit S3-805,1/2MB	$175/220
ORCHID Same w/voice annotation	$219/call
ORCHID Celsius 9000	$419
GENOA ET4000	$149
GENOA 8500VL, cirrus logic	$136
GENOA 8700VL, S3-805	$180
ATI Ultra Pro, 2MB, 26wm	$395
Mustang VLB Cirrus logic1/2MB	$109/149

PORTABLES

NOTEBOOKS

TWINHEAD SLIMNOTE

386 SXL-25, 2MB, 60MB / 80MB	$1294 / $1339
486 SLC-33, 2MB, 80MB/130MB	$1650 / $1794

LEADING EDGE

386 SXL-25, 4MB, 80MB	$1431
386 SL-25, 2MB, 80MB, COLOR	$1980

CHAPLET/SUNRACE

386 SX25, 4MB, 80MB/120MB	$1199 / $1399
486 SLC, 2MB, 80MB/120MB	$1475 / $1599

(........the only notebook w/SCSI port........)

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Disk Pack Drives

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MOTHERBOARDS

(Many of our new M/Bs have Pentium Socket)
Also See Local Bus Section

286-12/20	$44/59
386SX-25/33/40	$79/89/99
Stallion 386DX-40 w/64k Cache	$144
Stallion 486SLC-25 Cyrix	$152
Stallion 486DLC-33/40 w/64K	$219/275
Stallion 486SX25	$246
Stallion 486DX-33 w/64k	$383
Stallion 486DX-33 w/256k	$411
Stallion 486DX-50 w/256k	$575
Stallion 486DX2-66 w/256k	$649
Stallion EISA 486DX-33 w/256k	$499
Stallion EISA 486DX-50 w/256k	$659
Stallion EISA 486DX2-66 w/256	$739

VESA Motherboards.....see Local Bus Section

Call for pricing of M/Bs w/o CPU

CONTROLLERS

IDE 2FD/2HD	$12
IDE 4FD/2HD	$33
IDE w/ 2SPG..gen/WD	$16/26
IDE Caching UltraStor	$199
IDE EISA DTC	$135
MFM ST21M	$37
RLL 4FD/2HD	$69
Kouwell 531 4Port Serial 16C550	$69

SCSI

Future Domain Comp	$52
DTC	$99
ADAP 1522B,C/Kit	$90/140
ADAP 1542C/Kit	$205/255
ADAP 1742 EISA	$429
DTC EISA Caching	$485
MYLEX EISA Caching	$565
DPT Smart Cache+EISA	$540

ESDI

DTC	$119
Maple 64K new version	$130
Ultra 12F 32K	$164
Ultra 22F Caching EISA	$449
XT FDC360/1.2	$13/24
XT HDC	$45

ADAPTERS

(See Local Bus and CAD Sections too)

MGP	$12
Color Card	$23

VGA/SVGA

VGA 256k	$25
Trident 512K/1MB	$38/55
Tseng 1MB	$75
Mustang 1MB Window Accel	$84
Diamond Speedstar 24X	$159
Diamond Stealth 24	$164
Fahrenheit Plus wo/w VA	$165/219
ATI Ultra Grpx 1MB w/Mouse	$239
ATI Ultra Plus w/2MB	$329
ATI Ultra Pro w/2MB	$409
Hercules Graphite	$289

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286-20 M/B, 1MB, 1.44 and 1.2 FDD, 40MB HDD, IDE/2SPG, VGA Card, most languages K/B, VGA Monitor, Mouse, 100/220V..............................$578

MONITORS

MONO

Mono 12"	$73
Mono 14"	$91
Mono 9" VGA	$135
Mono 14" SVGA 1024 x 768	$109

VGA/SVGA

VGA 13" .28 Color.......ref	$150
VGA 14" .41 Color......ref	$159
VGA 14" 640 x 480, .51 / .41	$166 / 197
SVGA 14" 1024 x 768, .39 dpi	$207
SVGA 14" 1024 x 768, .28 dpi	$237
CTX Autoswitch 1024, .28 dpi	$255
SVGA 14" 1024x768 .28 NonInt	$269
Black SVGA 1024,.28 dpi	$279
CTX 14" 1024 .28dpi Hitachi NI	$299
Viewsonic V6E 14", 1024 .28 NI	$343
Sony 1304S 14" .25 dpi Low Rad NI	$545
Mitac 1564S15" .28 dpi 1280x 1024	$399
Samsung15" NI Flat .28dpi 72 Hz	$449
Mitac 17" .31dpi 1024 72Hz NI	$599
Samsung 17".26dpi 1280NI Microp	$899
Maganavox20" 1280 x 1024 NI	$1357

See Many High-End Monitors in the Engineering/CAD Section.

CASES/PS

Baby Desk/Tower w/ PS	$54/52
Medium Tower/Full AT w/ P	$77/69
Full Tower/Super T. w/PS	$89/155
Rack Mount W/PS	$299
File Server w/ 400W PS, 3 Fans ....12 F/HDD, black/beige	$494

DIAMOND (Black/Beige)

Baby Desk/Tower w/PS	$79/82
Medium Tower Reg/Big w/PS	$89/119
Full Tower w /PS	$129

External HDD Cases

1HH...65W	$89
1FH/2HH...65W	$110
2FH/3HH...65W	$137
SCSI Cables Int/Ext	$9/10

Power Supplies

XT Power Supply	$34
PC Power XT Turbo Cool 230	$80
220 AT	$46
PS2 200/300W	$40/95
Full Tower 230W	$58
Full Tower 300/400	$80/154

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Spill Resistant 101 Enhanced	$20
MaxiSwitch / M-Click	$31/34
KeyTronic	$35
BLACK 101	$39
SEJIN J-Mouse(mouse under 'J' Key)	$89

Also line of European/Arabic KBs

S-Mouse/TBall	$10/25
LogiTech First/2btn Ser	$39/19
LogiTech MouseMan Ser/Par	$64
Microsoft Original	$69
BLACK SERIAL	$19

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Floppy Drives

YE Data 1.2/1.44MB	$50/45
Teac 1.2/1.44MB	$54/48
Teac Dual Floppy 1.2 + 1.44 MB	$139
YE Data/Teac 2.88 MB	$82/89
Toshiba 2.88MB	$65

.............................Special Controller Required

IDE

CON 40MB 25 msec	$109
ST 40MB 19 msec	$109
CON 60MB 19 msec	$135
CON 80MB 19 msec	$164
CON 120MB 19 msec	$190
MXT 130MB 15 msec	$190
CON 170MB 17 msec	$215
CON 212MB 12 msec	$299
MXT 213MB 15 msec	$269
MXT 245MB 15 msec	$299
WD 340MB 12 msec	$429
MXT 340MB 15 msec	$415
FUJ 330MB 12 msec 5yr	$589
FUJ 540MB 12 msec 5yr	$779
CON 540MB 12 msec	$819
MXT 540MB 12 msec	$795

MFM

ST80......full h	$259

ESDI

MXT 338 / 670MB	$995 / 1190

SCSI - 3.5"

MXT 130MB 15 msec	$229
MXT 213MB 15 msec	$315
CON 212MB 12 msec	$325
MXT 340MB 15 msec	$539
Quantum PRO 425MB 9msec (limited stock)	$645
FUJ 520MB 11 msec 5 yr	$789
CON 540MB 12 msec	$845
MXT 535MB 12 msec	$895
MXT 540MB 8 msec Magix	$1049
TOSH 877MB 12.5 msec	$959
MXT 1.2GB 8 msec Magix	$1389
ST 1.2GB 10 msec	$1099
FUJ 1.2GB 10 msec	$1499
TOSH 1.2GB 12 msec	$1199

SCSI - 5.25"

ST 670MB 14 msec	$1029
ST 670MB 11 msec	$1329
ST 1.2GB 14 msec	$1099
MXT 1.2GB 13 msec Panther	$1099
FUJ 1.2GB 14 msec	$1259
MXT 1.7GB 13 msec Panther	$1275
ST 1.7GB 14 msec	$1399
ST 1.7GB 11 msec Elite I	$1889
ST 2.1GB 11 msec	$1879
FUJ 2.0GB 11 msec	$1995
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ST 2.4GB 11 msec Elite II	$2539
ST 3.4GB 11 msec	$3745

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...FC-10 high perf card	$85
Colorado Trakker 120 / 250MB	$344 / 404
Summit Express 305MB 10Mb/sec	$264
Archive Viper 215MB hh SCSI I/E	$469/ 875
Viper 525MB hh SCSI Int/Ext 6MB/sec	$679/950
YE DATA 600MB SCSI	$529

(>500MB for PC / SERVER)

Colorado 700MB	689
.......FC-15 high perf card	$181
Anaconda 1.35GB Int 5.25 hh SCSI-2	$920
Colorado 2.4 / 4.0 GB Qic 5.25	$969 / 1499
Python 2GB3.5"4mmDATSCSI .5m I/E	$1175/1468
Python 4[8]GB 3.5" DAT SCSI .5m I/E	$1319/1587
HP 2GB DAT 4mm Int/Ext	$1095/1245
HP 5GB DAT 4mm Int/Ext	$1320/1475
MAYNARD 2GB 4mm DAT Int/Ext	$1890 / 2060
MOUNT FS1200 4mm DAT Int/Ext	$1840/2133
EXABYTE 2GB 8mm DAT HH Int/Ext	$1485 / 1815
EXABYTE 8250 5GB HH 2yrs Int/Ext	$1795 / 1875
EXABYTE 8505 10GB HH 2yrs Int/Ext	$2475 /2770

..(above drives require special contr & soft drivers)

TAPE BACKUP DRIVERS

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Novaback for DOS	$89
Novaback for 0S/2	$89
Novanet Multiuser NLM	$439
SYTOS for DOS/NOVELL, GEN	$185
ARCserve Solo	$185

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RICOH 128MB RO-3010E 3.5" Int	$1045
RICOH 5031E Internal 650MB	$2250
PINACLE MICRO 650MB 19msec	$2995
PANASONIC 1GB Internal	$2489
MAXOPTIC 1GB Tahiti IIM 35msec	$2685
PINACLE MICRO 10GB 19msec Ext	$7995

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Seagate Barracuda 3.5" HH (8 msec avg. seek, 4.17 msec lat., 7200 RPM)
Barracuda 1.7 / 2.5 GB..........July / August

FLASH Card Hard DRIVE

ST 75A 1.8" 5.2MB IDE < 1.5ms	call
ST 710A 1.8" 10.4MB IDE < 1.5ms	call
ST 720A 1.8" 20.9MB IDE < 1.5ms	call
ST 740A 1.8" 41.9MB IDE < 1.5ms	call

STORAGE MEDIA

Floppy 1.44 Bulk	$.79
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Tape DC2000XL	$18
Tape DC2120 250MB..Formatted	$18.5
Tape DC 6250 5.25", 1/4" Cartridge	$27
Tape DC 6525 5.25", 1/4" Cartridge	$31
TK50 for DECs	$26
DT-2400 2.4GB .25" Cartridge	$54
DT-4000 4.0 GB .25" Cartridge	$57
DAT 4mm 60/90 mtr	$19/29
DAT 8mm 54/112 mtr	$18/24
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Bernoulli 44MB 3Pk	$315
Bernoulli 90MN 3Pk	$415
Magneto-Optical 650MB Cartridge	$159

OPTICAL CARTRIDGES

600MB 5.25"	$109
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128MB 3.5"	$59
10024 B/S WORM 5.25"	$109

SOFTWARE

Utilities

Norton Anti Virus2.1 / Utilities6.01	$81/107
PC Tools 7.1 w/Antivirus	$99
MS Works for Windows	$124
After Dark Startrek	$39
Carbon Copy Plus 6.1	$149
Corel SCSI Software	$79

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DBASE IV 1.1	$469
FOXPRO 2.0	$490
QuattroPro/Lotus 1-2-3	$299 / 379
MS Excel for Win V4.0	$298

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PageMaker for Win	$475
Word Perfect 5.1	$256
Corel Draw 3.0	$336
Adobe type manager	$65
MS Office for Windows V4.0	$479
Design CAD 3,1 3D	$218
AutoCAD Release 12	$3095

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SCO UNIX DEV sys3.2.4	$849
SCO UNIX GT m user 3.2.4	$849
DOS 3 / 4 / 5 w/sys	$36 / 42 / 52
DOS 6..DR	$69
Windows 3.0 / 3.1 upg w/sys	$49
Windows 3.1 w/mse w/sys	$64

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DacEasy Payroll 4.3	$99
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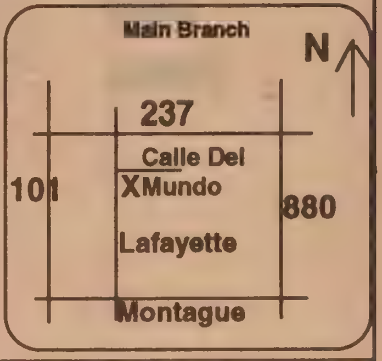

Interfaces And You

Principles, Resources, And Trivia

BY DAVID MORGENSTERN

BMUG

Every morning I head down to my corner coffee stand for a fine cup of dark roasted brew. On a table littered with sugar packets and stirring sticks sits a pair of white thermos serving jugs, one filled with half 'n' half, and the other with low-fat milk. There are no signs or labels, other than that one of the jugs has an orange dot on the handle.

How would anyone know which jug was which? True blue (mountain) coffee fanatics would discern that the color orange is the food-industry symbol for decaffeinated coffee. The de-fatted milk product is therefore placed in the orange-marked container. Obvious? Maybe not. But only the hardest-core addict would claim that their coffee stand interface contributes as much to personal productivity as their computer interface.

THE INTERFACE BEHIND THE MASK

Last January, Addison-Wesley came out with *Macintosh Human Interface Guidelines,* a companion to the new multi-volume edition of *Inside Macintosh.* The first edition of the book came out in 1988, and was called *Human Interface Guidelines: The Apple Desktop Interface for any Macintosh or Apple II computer.* Apple II computer? Was that like disco?

The guidelines describe the Macintosh interface as it existed in 1992, before the introduction of currently rumored additions, such as voice and pen input. It was also written before widespread experience with WorldScript and QuickDraw GX, which have the potential to influence what users expect from their software.

Perhaps it's time for a little refresher course in the eleven basic design considerations (it used to be a top ten list) of the Macintosh. In no order:

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- **Metaphors from the real world.** The Macintosh desktop is a metaphor drawn from a familiar real-world working environment. We are comfortable with these familiar concepts, and relate them to physical objects we have used or actions we have performed. Documents look like pieces of paper that we can place in folders, or in the trash.
- **Direct manipulation.** Some users think that when they move an icon on the desktop, some *thing* actually moves. Get unreal! The arrow pointer is not a toothpick, stabbing a cocktail icon. There's no "there" anywhere on a computer. It's all a number soup. But when you use the Mac, you're supposed to believe that icons really are little objects that you can move around.
- **See-and-point.** You should easily see what toys are available to be played with, and be able to play with them. The word *point* is critical, since it presupposes a mouse, or mouse substitute. Nowadays, mice are commonplace, but it wasn't too long ago that captains of industry charged that the Mac was designed by the Soviet Union to limit American productivity.
- **Consistency.** Macintosh applications all share common elements, and similar actions. Users can rest assured that when they've learned how to use one Mac program, everything will not be different in the next.
- **What you see is what you get (WYSIWYG).** Users should be able to readily see the commands and choices that they need to get their work done. They shouldn't have to remember everything, but should be able to find the features easily.
- **User control.** The user should be in charge, and initiate actions on the computer. The Mac should be a digital parent, protecting the user from the rough and tough decisions of life on the desktop. If users are going to really screw things up, and lose data, they should be given warnings, but allowed to make the mistakes.
- **Feedback and dialog.** We want to know that our program has received a command, that it's thinking about the task, and how long things are going to take. These clues can be beeps, blinks, spinning cursors, and other cute indicators.
- **Forgiveness.** Macintosh programs are not supposed to sneer at you, and tell you what a dummy you are for doing some action. That's what computer consultants are hired for! Users should be able to explore their programs, and easily reverse actions.
- **Perceived stability.** The elements of the Macintosh user interface are not glued down inside the case or in the monitor. Programmers have to include them in the code they write. Users expect to see the menubar, window borders, and the other graphical user interface elements that we've grown accustomed to.
- **Aesthetic integrity.** Macintosh programs should be graphically pleasing and have a strong sense of design, in addition to their functionality.

The latest addition to the list of interface principles is *Modelessness.* "Modes" describes the times when everything grinds to a halt on your Macintosh, and you're required to do something, and *only* that something. You can't click into another program, or check on another piece of data. Macintosh users have always hated modal dialog boxes, since the data absolutely necessary to correctly respond to the dialog is usually hidden by the arrival of the box. Modelessness used to be a "general design consideration" in the old guidelines. It's graduated up into the advanced class.

> *There's no "there" anywhere on a computer. It's all a number soup. But when you use the Mac, you're supposed to believe that icons really are little objects that you can move around.*

FACE THE MUSIC

Here's a small quiz on the Macintosh user interface. Do you really know what's what on your desktop?

1. The two fundamental paradigms of the Macintosh desktop are

a) Survival of the fittest, and might makes right.

continued on page 107

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Mac Centris 650 8MB/230HD	**$3249**
Mac Centris 650 8MB/230HD/CD	**$3679**
Mac Quadra 800 8MB/230HD	**$3999**
Mac Quadra 950 8MB, *In Stock*	**$4595**
PB 160 4MB/80HD, *Great Price*	**$2449**
PowerBook 170 4MB/40HD/Fax, *New*	$2395
PowerBook 180 4MB/80HD, *In Stock*	$3799
PB Duo 210 4MB/80HD, *In Stock*	$1709
PB Duo 230 4MB/80HD, *In Stock*	$2149
PowerBook Duo Dock, *In Stock*	$999
Sony 1320 14" Trinitron, LCIII, Centris	$399

Mac Trade-In

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- We Buy or Trade Any Macintosh CPU (Mac Plus minimum) & Peripherals
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Prices Good w/ Ad Only

†External Unit Add $90 ea.

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Quantum ELS 85MB HD	$249†	Apple 500MB HD	$899
Quantum ELS 170MB HD	$379†	Fujitsu 520MB HD	$999†
Quantum LPS 240MB HD	$449†	Toshiba 1.2 Gig HD	$1499†

Macintosh Rentals

Security Deposit Required

Mac SE 4MB/40HD	PowerBook 170 4MB/40HD	Mac Plus 2MB/20HD	Mac IIsi 5/80 13" Color
$69 Monthly	**$179** Monthly	**$59** Monthly	**$179** Monthly

Macintosh Lease To Own

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Mac Quadra 800 8MB/230HD	$142/Mo
Mac Quadra 950 8MB	$163/Mo
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Apple 16" Color Display	$46/Mo
NEC Silentwriter 95	$41/Mo
LaserWriter Pro 600, 8MB RAM	$71/Mo
LaserWriter Pro 630, 8MB RAM	$89/Mo
SuperMac 20" Multimode Trinitron	$89/Mo
SuperMac 21" Platnum Monitor	$39/Mo
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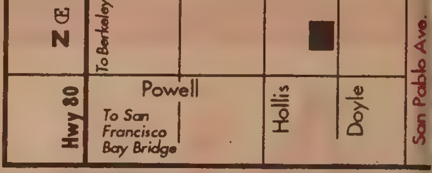

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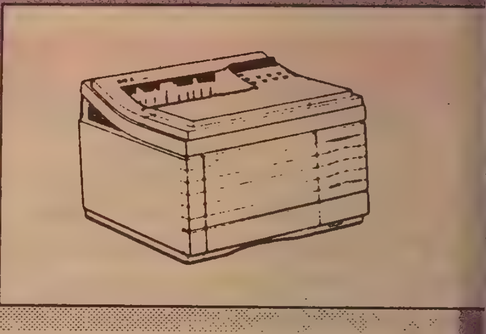
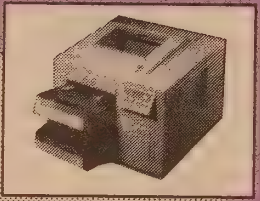
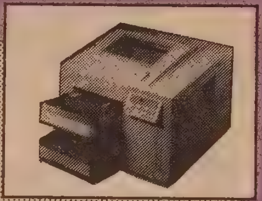


HP LaserJet 4Si Printer



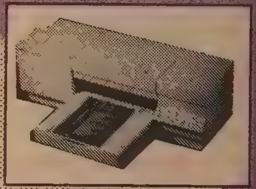
This 17 pages per minute, high-performance, 600dpi network printer offers the power & performance to meet users' expanding needs. Add interfaces, memory, paper-handling at any time.

HP LaserJet 4SiMX Printer



The HP LaserJet 4SiMX is a high-speed, high-volume, high-resolution laser printer designed for multiple network environments. It offers simplicity in complex networking environments.

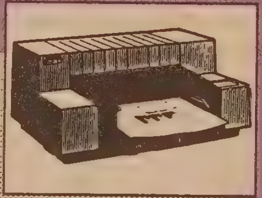
HP PaintJet XL 300PS



The HP PaintJet XL300 Color Postscript Printer offers users the best of both worlds—PCL *and* PostScript printer languages. RISC-based technology and 6MB of printer memory (expandable to 18 MB) accelerate Postscript language processing and help keep your graphics and desktop publishing projects on schedule.

3195

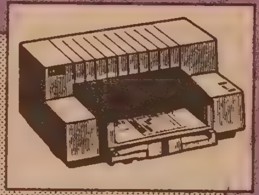
HP InkJet Printer F/PC DeskJet 500 DeskJet 500C New DeskJet 550C



- 3 Year mfg. warranty
- Extremely quiet operation
- 300 dpi printing
- 7 ppm in best mode 550C

$365/479/679

HP InkJet Printer F/Macintosh® DeskWriter/ DeskWriterC/ DeskWriter 550C



- 3 Year mfg. warranty
- Extremely quiet operation
- 300 dpi printing
- 7 ppm in best mode 550C

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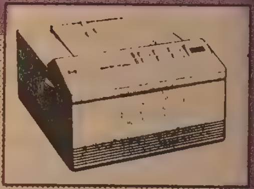
* $50 REBATE EXTENDED TO APRIL 30th

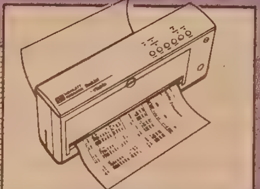
HP LaserJet IIP Plus/IIIP



- 300 dpi enhanced printing
- 4 ppm printing speed
- Compact desktop size easy to fit in tight space
- SR/Par support F/IIIP
- 14 resident fonts
- Fully compatible and easy to setup

$745/849

HP DeskJet Portable



- 300 dpi, laser quality
- Lightweight 4.4 lbs
- Built-in fonts
- Prints up to 100 pages on battery power

Battery $49
Paper Feeder $89
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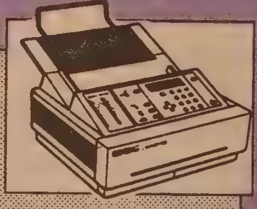
Rapid Recharger $89

$379*

* $75 REBATE IF PURCHASED W/ACCESSORIES

HP LaserJet Fax



- Plain paper fax machine utilizes your existing laser printer
- 300 dpi resolution
- Auto document feeder capability
- 17 sec/page transmission

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HP Software Solutions

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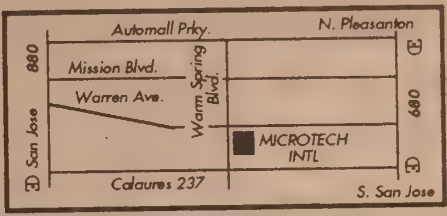

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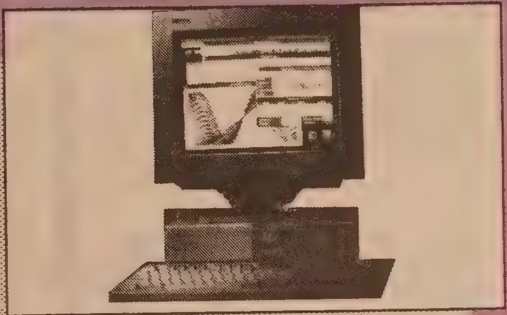
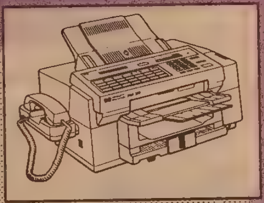
* When purchased by June 30, 1993



"Each machine demonstrates HP's workmanship and dependability, while offering cutting-edge performance"
-PC Magazine

HP Plain Paper Fax 310



- 300 dpi scanning & prints
- Built-in telephone answering machine interface
- 20-page auto document feeder
- 32 greyscale level

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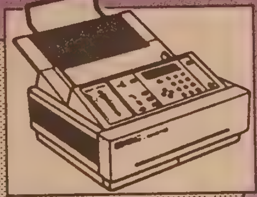
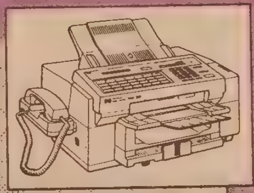
HP LaserJet Fax



- Plain paper fax machine utilizes your existing laser printer
- 300 dpi resolution
- Auto document feeder capability
- 17 sec/page transmission

$899

HP Plain Paper Fax 200



- 300 dpi scanning and print
- Built-in telephone answering machine interface
- 20-page auto document feeder
- 32 greyscale level

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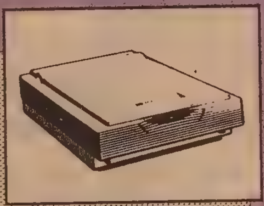
HP ScanJet IIP/IIC



- Best scanner in the Market for PC's and Mac interfaces
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- Optional auto document feeder
- 24-bit color capability and 256 greyscale leve
- Adobe PhotoShop 2.5LE

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- HP DraftPro DXL Plotter
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- HP 7475A Color Desktop Plotter
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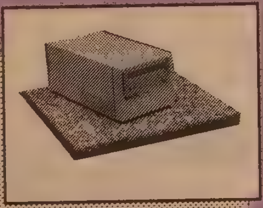
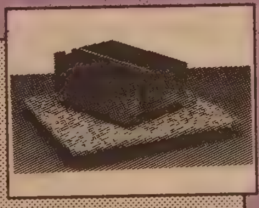
HP DAT PC Backup Solution



The HP DAT PC Backup Solution is the quick and easy answer to saving your computer data.

The high performance HP DAT PC Backup Solution uses a 2.0 gigabyte DAT drive, can save 300 megabytes of data in under 30 minutes, and can restore the data at the same speed

HP 5.25-inch Hard Disks



- 673/1070/1355MB
- Full Height
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- Average seek time 13.5 ms
- Data Transfer Rate
  Asynchronous (burst) 1.5
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Authorized HP

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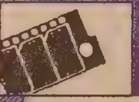

SIMMS

IBM TYPE

1x9-60 3 Chip	C
1x9-70 3 Chip	
1x9-80 3 Chip	
1x9-80/70/60 9 chip	A
1x9-80/70 SIPPS 9 chip	
1x9-100 9 Chip	
4x9-60	L
4x9-70	
4x9-80	
16x9-70	L

MAC TYPE

1X8-100 8 Chip	$26.00
1x8-80 2 Chip	29.00
1x8-70 2 Chip	30.00
1x8-80/70 8 Chip	32/33
2x8-80/70	63/66
4x8-80/70	115/119
8x8-80/70	CALL
16x8-80/70	CALL
Mac IIfx 4/16MB Kit	135/490
256K VRAM	28
512K VRAM	56
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512Kx36-70	84.00
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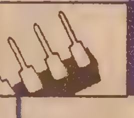
1x36-60	CALL
2x36-80/70/60	288/299/CALL
4x36-80/70/60	570/585/CALL
8x36-70 NEW!	CALL

32 bit SIMMS are also available



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256x4-70/80	4.25
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1MBx1-80	4.20
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387SX-33 ULSI C&T	79
387DX-20 Intel	44
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LASER PRINTER MEMORY

Note: Price Includes Memory, Board & Installation Instructions

IBM LASER		
4019/4019E	1/2/3.5MB Board	$89/119/169
4029 (All Models)	4MB	139
EPSON LASER		
EPL 6000	2/4MB	$114/175
EPL 7000	2/3MB	125/159
Action Laser II	2/3/4/5MB	108/139/169/199
HP LASER		
HP IIP,IIP+, III, IIID, IIIP	1/2/3/4	64/99/134/164
HPII/IID	2/4MB Board	$105/169
HP 4/4M,	4/8MB	149/289
IIIsi	4/8MB	138/264
LaserJet FAX	1MB	82
DeskJet 500/500c/550c	256K	52
Design Jet Plotter	4MB	144
PANASONIC LASER		
KXP4410/KXP4430	1/2/3/4MB	$89/115/149/184
KXP4420/4450I/4451	1/2/3/4MB Board	79/108/139/169
KXP4450	1MB	111
KXP4455	2MB	129
OKI LASER		
OL400	1/2MB Board	$84/109
OL800/820 Only,	2/4MB Board	109/165
OL810	2/3/4MB Board	145/179/219
QMS LASER		
PS 410	2/3/4MB	119/165/189
PS 860, 1700	1/4/8MB	53/133/166
PS 815, 825, 815MR, 825MR	2/4/6	168/232/295
SHARP LASER		
9500PS	1MB	55
JX-9500/9700	1/1.5/2.5/4MB	105/135/188/344
OTHERS		
Apple Laserwriter II/IINT/IINTX	4MB	$149
Brother HL-4	2/3/4MB	119/165/189
Brother HL-8E, V	1/2MB	99/139
Compaq Pagemarq 15 & 20	1/4/8	49/139/266
Fujitsu RX7100/7200	1/2MB	185/245
Kyocera F800, F800A, F800T	2/4MB	145/205
NEC Silentwriter 90/290	1MB/2MB	99/124
NEC Silentwriter 95	2MB	104
TI Microlaser	1MB	55

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Avanti	2/4MB	74/145
AST Premium Exec	4/8MB	134/259
AST Power Exec 3/25	4/8/16MB	CALL
Compaq Contura, lite 20/25	2/4/8MB	105/155/295
LTE Lite 4/25, 25C	4/8MB	219/355
Chaplet Notebook	2/4MB	155/249
Chicony 386SX	4MB	189
Chicony 386SL/25	2/4MB	129/229
DECPC 320P	2/4/6MB	195/269/389
DELL 320N & 212N	1/2MB	85/125
DELL 320N+	2MB	125
DELL 325N; NC	2MB	179
DELL NL25 &NL20	2MB	179
Epson NBS3	1/4MB	98/225
Everex TempoLX	2MB	88
HP 95LX	1/2MB	159/279
IBM L40SX, N33/SX	2/4/8MB	99/155/315
IBM N5I SX & SLC	2/4/8	105/169/299
IBM PS/2 N45 SL	2MB	179
MAC PB 160, 180	6/10MB	249/425
MAC PB 140,170	2/4/6MB	89/175/229
MAC PB 100	2/4/6MB	89/179/239
Mac Duo		CALL
Magnavox Metalis 386SX	4MB	195
NEC Ultralite 286F	1/4MB	99/199
NEC Ultralite III, SL25C	2/4/8MB	139/249/425
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Sharp PC 8501	2MB	105
Sharp 6781/6881	2MB	119
Sampo NB SX/16, SX/25	2/4MB	145/225
TI Travelmate 2000	1MB	77
TI Travelmate 3000	2MB	69
TI Travelmate 4000	4MB	219
Zenith 320L, 325LB	2/8MB	185/495
Zenith Turbosport 386, E	1/4MB	95/299
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Zenith Mastersport	2MB	99
ZEOS 286, 386	2MB	88

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	4/8MB		155/299
386 Valuepoint	2/4/8		89/159/305
486 Valuepoint	4/16MB Kit		149/595
PS/2 30-286	2MB	30F 5360	89
50Z, 55SX, 65SX, 70	2MB	6450604	79
	4MB	34F2933	145
40SX, 35SX, 35LS	2MB	6450604	79
	4MB	87F9977	149
70A21, A6I, 121	2MB	6450608	84
80-111, 121, 311	2MB	6450379	109
80-A21, A31, A61	4MB	6451060	210
95, 90, P75, PS/1 Pro	2MB	6450902	110
	4MB	6450128	149
	8MB	6450130	295
16 Bit Exp. Bd. for Model 50, 50Z, 60, 65SX	0K	6450609	144
32 Bit Exp. Board for All 70 & 80 Models	0K	64F30XX	164
RISC 6000	16MB	4010	745
	32MB	4033	1490
	64MB	4036	2890
Other Models			CALL

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CL57SX	2/4/8MB	125/219/375
L40SX	2/4/8MB	95/149/315
N33SX	2/4MB	95/149
N51SX & SLC	2/4/8MB	105/169/309
Thinkpad	2/4/8MB	125/219/375

COMPAQ MEMORY

Model		P/N	
LTE 286	2MB	117081-002	$115
	4MB	117081-003	175
SLT 286	4MB	110237-001	299
LTE 386S/20	2MB	121125-001	119
	4MB	121125-002	195
Contura, Lite 20/25	2MB	129769-001	105
	4MB	129769-002	155
	8MB	129769-003	295
LTE Lite 4/25, 25C	4MB	142337-002	235
	8MB	142337-003	395
Portable 386	1MB	107651-001	109
	4MB	107653-001	299
Portable III	2MB	107332-001	79
	EBD	167811-001	199
SLT 386	2MB	118304-001	119
	4MB	118305-001	185
Deskpro 386S (E.Board)	4MB	113634-001	239
	4MB	112534-001	169
Deskpro 386/33L, 486/33L, /50L/25			
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	4MB	118690-001	145
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Deskpro 486/33L, 486/50L, 386/33L			CALL
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	8MB	141742-001	375
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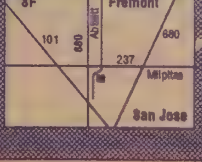

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continued from page 102

b) Selection then action, and drag-and-drop.

c) Icons and menus.

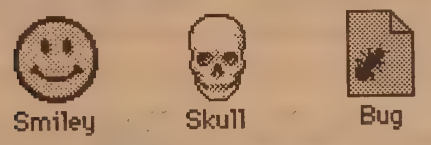
d) It's an information appliance, and funny beep sounds.

2. The Ellipsis Character '…' after a menu item means

a) that the selection will lead to a potentially dangerous action.

b) that you've been working too hard and are seeing spots on the screen.

c) that your computer has been infected by the MenuMite virus.



3. The icons shown in Figure 1.

a) are prototype icons for the Finder, Trash, and debugger document.

b) are reserved for Apple use only.

c) are folder icons.

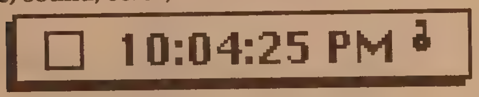
d) are understandable to every Macintosh user.

4. Design considerations are given to three general areas:

a) young, old, and animal (non-human) Macintosh users.

b) worldwide cultural and language requirements, provisions for disabled users, and collaborative multiuser situations.

c) sound, color, and animation.



5. What's wrong with Figure 2.? No cheating here!

a) The sun's moving from right to left.

b) The flag is facing the wrong direction.

c) There's no provision for daylight saving time.

d) It's past ten-o'clock at night and I still haven't finished this quiz.

Answers:

1. b) In the first paradigm, the user selects something, an icon, text, or graphic, and then selects some action to be performed (i.e. Bold or Open, and so on). The second paradigm has been expanded under System 7. We used to find it primarily expressed in the action of the Trash in the Finder, where the Trash had a verb (Remove) connected to it. We now can select a document and drag it onto another icon to open, print, or perform some other action. Some developers are even using this drop-and-drag behavior in their applications, with tear-off menus and palettes.

2. d) The ellipsis may look like three periods, but it is created with the Option + ";" keys. Most users think that the ellipsis means that you have to fill out a dialog box, or read a warning window. This is not necessarily the case.

The Get Info command brings up a window, but that is just the correct action of getting Info. It doesn't get an ellipsis. A Revert command, to bring a document back to its condition at the last Save, might bring up a dialog box giving you the chance to cancel this potentially dangerous operation. But Revert shouldn't have an ellipsis, since it's not asking for more information.

3) c. System 7 allows users to change the appearance of almost every icon on the desktop. This is an unfortunate interface contamination from HyperCard, where users can easily change the appearance of buttons and card backgrounds. After changing the original icon, it's impossible to know if an icon is a file, folder, or application. It would have been better to have required that file, folder, and other non-application icons keep their "shapes," the recognizable graphic elements that give easy visual clues to the type of the document.

4) b. Apple is trying to provide users with computer and software products that can address all their individual computing needs, cultural, language, physical, and working. A major part of this plan is to educate developers on the specific needs of different user communities, whether that is two-byte character sets for non-Roman script users, different calendar support, or a blinking "beep" for hearing-impaired users. The guidelines even warn developers of users with seizure disorders, triggered by screen display refresh rates between 10 to 50 Hz.

There's a rumor floating around that Apple will build a very low-cost Macintosh next year, which will include a floppy drive with a latch. This would replace the auto-eject model that's been standard on the Mac since day one. This would violate a hardware design consideration for users with a physical disability who might have trouble turning the latch.

5) a. If you'll look closely at your desktop, you'll see that all the window drop shadows and System icons are shaded with a consistent light source. This light always shines from the upper-left hand side of the screen.

INTERFACE-OFF

I asked some BMUGers to comment on the current state of the Macintosh interface.

- **Lorca Hanns, BMUG West's disability expert**, "There needs to be a lot more work on disability access issues. Some of this has already been accomplished in the System 7 Finder, but voice feedback for visually disabled users, and voice input for physically disabled users, is a must. Beyond that, there needs to be input with AppleScript tools, so that users with disabilities can get more work done in less time. In many ways the icon interface can slow down a person with disabilities, so Apple needs to improve the interface access if it's to keep a business advantage."
- **Elizabeth Moller, Human Interface Engineer & Finder Gal at Apple's Macintosh Human Interface Group.** "Consistency for consistency's sake is not necessarily good, but there are a lot of places where a little consistency between applications could go a

UPCOMING EVENTS:

MAY 6	BRAINS SOFTWARE ENGINEERING MEMORIZER (DICTAPHONE SOFTWARE); EO INC. EO PERSONAL COMMUNICATOR 440 (PEN BASED PALMTOP).
MAY 13	SOFTWARE TUTOR FLEXWARE (ACCOUNTING PACKAGE); DELTA TAO SOFTWARE SPACEWARD HO! (GAME); COLOR MACCHEESE, AND MONET (GRAPHICS).
MAY 20	TO BE ANNOUNCED.
MAY 24	BMUG SOUTH AT UNITED WAY OFFICE IN SAN JOSE. SOFTWARE TUTOR FLEXWARE (ACCOUNTING PACKAGE); EO INC. EOPERSONAL COMMUNICATOR 440 (PEN BASED PALMTOP).
MAY 27	TO BE ANNOUNCED.
MAY 31	BMUG WEST AT EXPLORATORIUM MUSEUM IN SAN FRANCISCO. CANCELED FOR MEMORIAL DAY HOLIDAY.

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long way. The best way to achieve this is to make it easy to do it the right way. We really dislike setting guidelines that just make programming harder. I always imagine programmers out there saying, 'Oh yeah, sure, easy for you to say.' In actuality, people seem to like guidelines, and we can't get them done fast enough.

"It's embarrassing when Apple products ship that don't follow our own guidelines. Apple is a big company, and we don't have nearly enough Human Interface Engineers to go around. It's tough to say 'do it this way' when Apple does it differently.

"One of the biggest mistakes developers make is to look at other applications they happen to have on their Macintosh to determine the 'right' way to do something. One of my pet peeves is the location of the OK and Cancel buttons. The Macintosh has OK and Cancel buttons in the lower right corner. Please don't look at the Print dialogs for inspiration!"

- **Phil Reese, Manager of User Services, USC Computing Services.** "The new Apple Keyboard is great in some ways and *terrible* in others. The split keyboard is easier to type on for touch typists. It also fixes a bug in the Extended Keyboard that Apple has known about for years, but hasn't fixed, probably because it can't be fixed without major reworking. The bug can be uncovered by typing the word 'about' as fast as you can on an extended keyboard. After some time you will likely see some semicolon characters instead of the 't's. Just a typo, you say—Not! Your fingers never touched the semicolon; rather, it's a problem with the way the Key Encoder parses the key press data. This doesn't happen on the new keyboard."
- **Leonard Rosenthol, Director of Advanced Technology at Aladdin Systems and a BMUG programming guru.** "The weak link in the User Interface chain is developers... If one developer screws up, the user loses. A particular thing in the Mac interface that I *hate* are hierarchical menus. They are too hard to use, and visually displeasing. I would like to see Apple give more direction in '3-D' looks with color, texture, and depth, since that is how developers are moving.
- **Kelly Schwarzhoff, student and BMUG BBS System Operator.** "I think the 'common' person still is confused by computers. Sure, System 7 is a far call from messing around with DOS's batch script or the UNIX vi editor, but it has a long way to go. I am the 'computer guy' for our high school's yearbook, and you'd be surprised at the 'stupid things' they don't know.

"Balloon help is a nice idea, but people really don't give a damn what all the icons they see can do. Instead, they want to know *how* they can do something. There is really no way to ask the Macintosh (via Balloon Help or any other method) how to do something.

"I haven't used OS/2 for a couple months, but they have a better help system, although not perfect. There is a help list that shows a bunch of topics. You just scan through the topics for what you want, and there's your answer.

"One method that may even be better is a query system. For example, I've probably been asked at least a thousand times (no exaggeration, they always forget, and ask me again and again) how to zoom in/out with PageMaker. It'd be great if they could say, 'How do I zoom?' and have the Help system respond.■

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Like any growing organization, it is many different things to its fourteen thousand international members. BMUG supports many Special Interest Groups (SIGs), a Bulletin Board System (BBS), free HelpLine, software library, weekly meetings, publications, and much more. BMUG also puts out a semi-annual 350+ page book that we call our "newsletter."

Our motto continues to be: *We're in the business of giving away information.*

Come and join in the dialogue at the BMUG main meeting every Thursday evening, 6:30–9:30(or whenever we finish), in the Physical Sciences Lecture Hall on the UC campus. BMUG West and BMUG South are monthly meetings held in San Francisco and San Jose.

The BMUG office, 2055 Center St. (a half block from the BART station), is open to the public 9 am to 5 pm. Please come by and say hello, meet other members, and hang out.

The BMUG HelpLine, (510)540-1742, and our fax number, (510)849-9026, provide technical assistance and telephonic handholding during business hours (11 am–5 pm). If your question can't be answered on the spot, we try to get you in touch with someone who can help. Of course, not every problem can have a happy ending—but we try.

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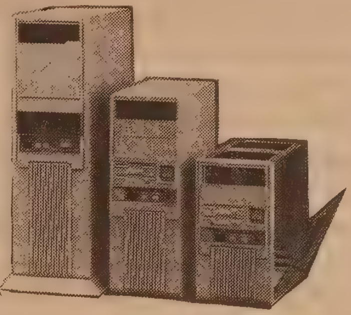

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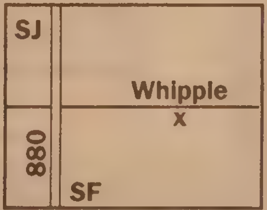
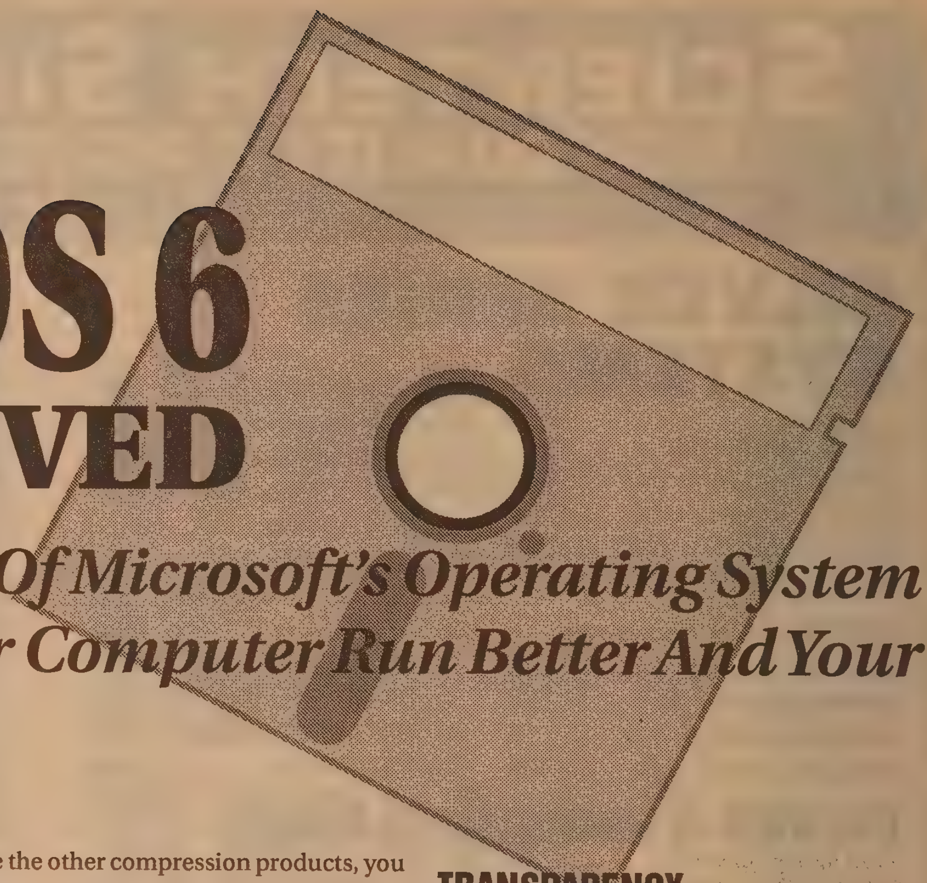


MS-DOS 6 HAS ARRIVED



The Newest Version Of Microsoft's Operating System Will Help Make Your Computer Run Better And Your Work Easier

BY WOODY LISWOOD

RESOURCES:

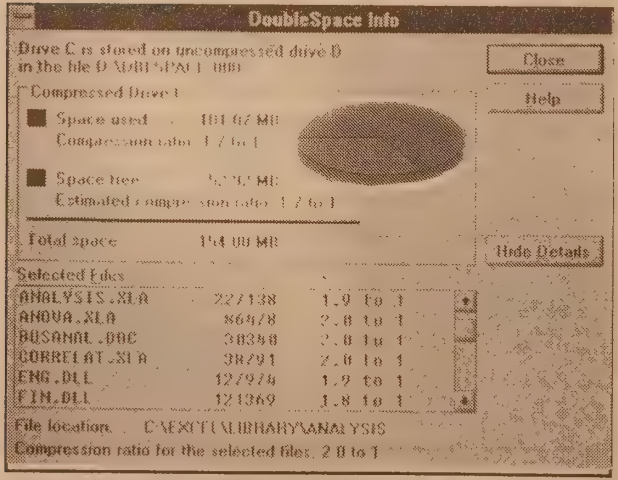
MS-DOS 6 (Upgrade after May 31, 1993, **$129.95**)
Microsoft Corp.
One Microsoft Way
Redmond, WA 98052
(206)646-5104

MS DOS 6 has hit the streets. What is the right question we should be asking ourselves? To upgrade or not? If so, when? Is it really better than 5?

The answer is yes, upgrade now. Why wait, DOS 6 is unequivocally better than 5 and it does more. There's better memory management, transparent data compression software, improved backup and restore, as well as a superb anti-feature—undelete—and many updated and improved commands and internal programs. While DOS 6 doesn't, yet, do your dishes, it does work better than ever with Windows.

DISK COMPRESSION

The most visible newness for DOS 6 is the DoubleSpace disk compression software. Microsoft has defined a "standard," which it calls MRCI for Microsoft Real-time Compression Interface. I have used other compression products and feel that DoubleSpace is easier to use, is as fast as or faster than Stacker or SuperStor, and works transparently in the background.



```
Drive C is stored on uncompressed drive D
in the file D:\DBLSPACE.000
Compressed Drive C
  Space used        101.67 MB
  Compression ratio 1.7 to 1
  Space free        52.33 MB
  Estimated compression ratio 1.7 to 1
Total space         154.00 MB
Selected Files
ANALYSIS.XLA      227138    1.9 to 1
ANOVA.XLA          86478    2.0 to 1
BUSANAL.DOC        38348    2.0 to 1
CORRELAT.XLA       38791    2.0 to 1
ENG.DLL           127974    1.9 to 1
FIN.DLL           121369    1.8 to 1
File location:  C:\EXCEL\LIBRARY\ANALYSIS
Compression ratio for the selected files: 2.0 to 1
```

DOUBLESPACE IS IMPORTANT FOR ANYONE WHO IS RUNNING OUT OF HARD DISK SPACE, AND IS PARTICULARLY IMPORTANT TO WINDOWS USERS

Like the other compression products, you must maintain a small portion of your hard disk for uncompressed data so that your machine can boot properly. In addition, Windows currently requires that its swapfile be maintained on an uncompressed portion of your disk.

DoubleSpace loads through your config.sys file. It then automatically switches from the uncompressed portion of the disk to the compressed portion and swaps the disk identifiers. This switch changes the compressed portion to "C" and the uncompressed portion "D" (or "H" or whatever you want it to be).

BEFORE YOU START

DoubleSpace is not part of the automatic installation program. After installing DOS 6 you must then run DoubleSpace from the DOS directory. Before doing this, I suggest backing up everything. Also, you should unload any network software which is running, and generally strip down the system so that DoubleSpace will only have itself to work with. After DoubleSpace is installed, you should then run your normal config.sys and autoexec.bat files.

Since file compression usually takes time, I suggest the following technique to do a complete installation of DOS 6.

- Back up everything
- Erase your hard disk
- Install DOS 6
- Install your backup software
- Install DoubleSpace
- Then restore your backup files

Using this methodology, you restore directly onto the newly created compressed disk. With tape backup software, the compression and restore took less than thirty minutes for approximately 140MB of files. When I just compressed the full disk, it took over two hours.

TRANSPARENCY

When I say that the compression software is transparent to the user, I mean that all of the DOS commands such as chkdsk work directly on the compressed disk, as well as the uncompressed disk. With other compression software, you must use their utility programs, designed specifically for their compression techniques, or risk losing your compressed information.

COMPRESSION GAINS

Compression does give you lots of extra room. On different computers, each with approximately 160MB of files, I enjoyed a compression ratio of 2:1. (I was using a Western Digital 200MB IDE and a Maxtor 200MB IDE.) The dir command now has an additional switch, "/c," which will show you the compression ration for each file as well as the other information you got from DOS 5.

If you already use one of the popular compression products, you don't need to worry. DOS 6 will convert both Stacker and SuperStor drives to its format.

COMPRESS YOUR FLOPPIES

MS-DOS 6 will also compress a floppy disk, doubling the 1.4MB of space to 2.64MB. Of course, when you move to work on another computer it must also have MS-DOS 6 and DoubleSpace.

CONFIG.SYS IMPROVEMENT

One of the best features of DOS 6 is the ability to step through a config.sys file upon bootup, or ignore it and the autoexec.bat file altogether. There have been many times when something I was changing caused the config.sys file to hang, causing me to reboot

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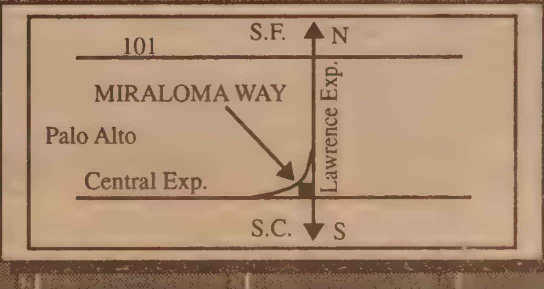

from a floppy disk just so I could edit out the offending problem. Now, with DOS 6, if you press F5 during the boot process you will bypass both the config.sys and autoexec.bat files. If you press F8, you will be asked, separately, if you want to execute each line in the config.sys file and if you want to bypass the entire autoexec.bat file. Unfortunately, you cannot step through the autoexec.bat file, which I feel should also be an option.

The config.sys file now allows you to carry multiple configurations. If you have a variety of device drivers that you use with specific applications, but don't want to always load everything into memory, you can set separate configuration files and load just when needed. The old way to work around loading everything, in case you forgot, is to have multiple config files and copy the appropriate file to the config.sys designation before you reboot. You also had to remember to copy the old one back before you reboot again.

MEMORY MANAGEMENT

Memory management has been vastly improved. After you get everything running, a program called memmaker will look at your config.sys and your autoexec.bat files and determine the optimum memory locations for each of the programs. One nice advantage from memmaker is that you will have the maximum lower memory available for your programs.

While this program is easy to run, I did find one conflict. Memmaker ran fine with everything on my computer except Lightning for Windows, which I was using as a CD-ROM cache program. The CD-ROM cache did fine when I manually installed it after running memmaker.

While DOS 6 doesn't, yet, do your dishes, it does work better than ever with Windows.

Memmaker makes does make it hard to make any modifications and experimentation yourself. After you run the program, and it works out the placement of your programs in high memory, it puts each program into a specific area of memory. Thus, if you delete a program, you will leave a gap in memory. Likewise, if you want to move things around, you will need to edit and delete the specific memory addresses for each program from

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ET4000 VESA LB 1 MB	95

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ViewSonic	473
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SVGA 14" .28dp Non-Interlace	264

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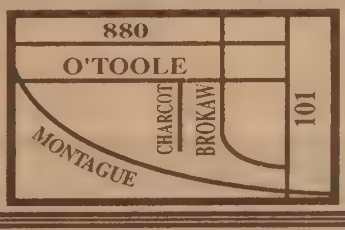

your config.sys and autoexec.bat files before everything works properly. The documentation suggests a specific order to load programs through your config.sys file. Follow Microsoft's recommendations before running this application.

On my two computers, both of which have 16MB of memory, memmaker made significantly more lower-end memory available. On one, I had 514,096K available before memmaker and 586,112K available afterwards. That is an increase of 72,016K of usable low memory for Windows and DOS applications. On the other computer, where I load a gaggle of drivers and full multimedia TSRs, CD-ROM driver, and four voice mail and fax goodies, I started with 448,144K of low-end memory and ended with 596,560K for a savings of 148,416K. I'm sold on memmaker.

In case you are unhappy with the way memmaker has put everything together, memmaker also has an undo command to put everything back the way it was before you started.

SMARTDRIVE

Smartdrv has been improved and works directly with the new compression software. It also supports write-behind caching, increasing your apparent speed. If you experience frequent power failures, though, you might prefer to disable the write-behind cache before you lose something critical.

BACKUP & RESTORE

Backup (and Restore) have been licensed from Symantec and will look familiar to anyone familiar with Norton Backup. While Microsoft does not offer the full suite of features included from Symantec, you do get enough to make this DOS backup program usable This is a significant advancement when compared to earlier versions of MS-DOS.

Why wait, DOS 6 is unequivocally better than 5 and it does more.

ANTI-VIRUS & UNDELETE

Microsoft has also licensed the DOS and Windows versions of both Anti-Virus and Undelete from Central Point Software. This version of Undelete works the same, except that you can now recover files without having

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386-33 MHz ISA	165
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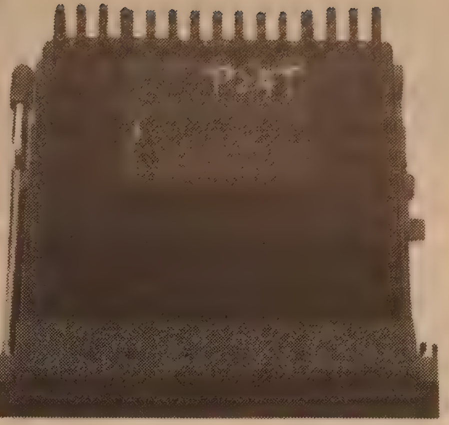
The 238 pins of ZIF socket mounted on the mainboard is considered to be able to extend the future upgradability of next generation OverDrive Processor from intel named P24T or so called P5.

intel inside



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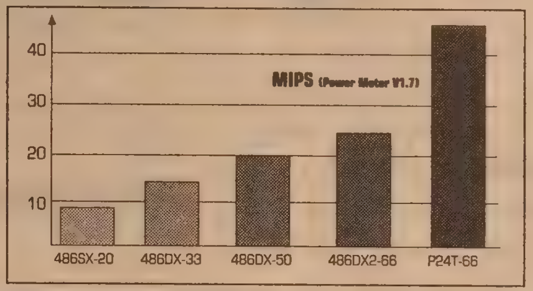
CPU Performance Comparison



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to exit Windows. The Anti-Virus program creates a list of files and sizes. When you run it again, any file that has changed in size is identified as a possible virus-affected program.

According to the documentation, Anti-Virus checks for over one thousand different virus signatures. With new virus code appearing frequently, any anti-virus program is quickly out of date. There is a BBS, although not an 800 telephone number, from which you can download the latest set of signatures to guard your computer files.

MOVE

The new Move command now lets you move directories as well as files. In earlier versions, Move would copy the files from where they were, to where you want them to go, then erase the files from where you started. Other Move commands would just change the FAT designation for each file from the directory it was in, to the new directory. This Move command now lets you move directories from one location to another.

POWER

If you have a laptop, there is a power program that should help you conserve battery power. The documentation claims that this will allow your batteries to run up to 25% longer.

DELTREE

If you have been annoyed about how you had to delete directory structures, the Deltree command will now let you remove a directory and all associated branches. In the past, you would have to get to the furthest subdirectory, delete all the files, switch up a level, remove that subdirectory, delete all files in the current directory, repeating this process, step by step, until an entire directory was deleted. Deltree now lets you name the entire path you want to delete, and then delete it.

SYSTEMS OPERATION MADE EASIER

The newest version of Microsoft's operating system will help make your computer run better and your work easier. With improved capabilities from Microsoft developing its own compression software and from its licensing programs, for things like backup, you get more flexibility for your money. Until Windows becomes its own operating system, I'd recommend upgrading to DOS 6. ■

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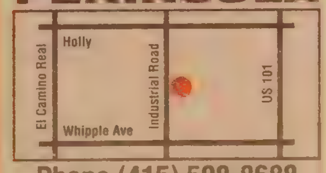

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A major advantage claimed for OS/2 is its 32-bit, multithreaded, truly multitasking operation. But while OS/2 runs on most hardware, and multitasks most DOS and Windows software, taking full advantage of these capabilities may require some boosting.

INTERRUPT LEVELS

The PC architecture requires every hardware device to use an "interrupt," or "IRQ," to communicate with the operating system. Think of IRQs as channels of communication that devices, such as hard and floppy disk drives, printers (parallel devices), and faxmodems (serial devices), must have available in order to operate.

OS/2 can recognize two parallel ports (LPT1, LPT2), and up to four serial ports (COM1-COM4). ISA and EISA systems provide seven *low* (IRQ0-IRQ7), and nine *high* (IRQ8-IRQ15) IRQs, and OS/2 sets them by default as follows:

PORT	I/O ADDRESS	IRQ	
LPT1	3BC	7	<<———required
LPT2	378	5	<<——— required
COM1	3F8	4	
COM2	2F8	3	
COM3	3E8	5	<<——— if not used by LPT
COM4	2E8	10	

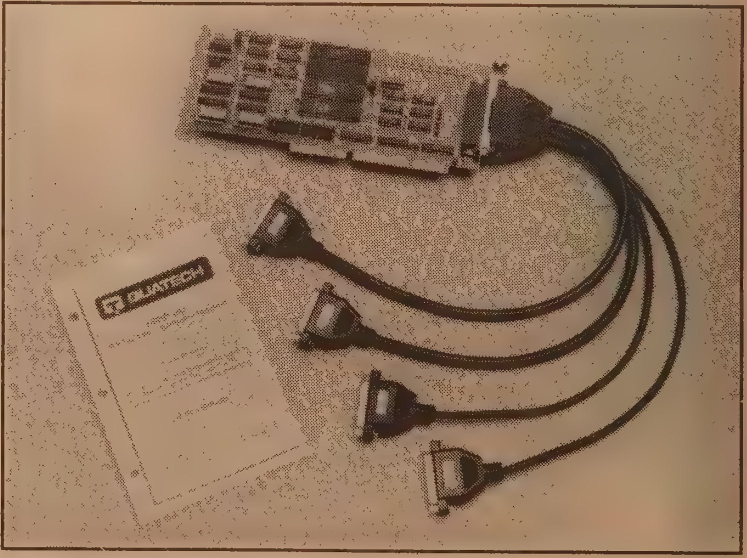
The average system comes with some I/O card (e.g. IDE adapter), which usually provides two serial ports, and one parallel port. Thus, default IRQ usage is something like:

IRQ USE:		
0	System Timer	
1	Keyboard	
2	[Cascade]	
3	COM2 <<———	serial port 2
4	COM1 <<———	serial port 1
5	Available	
6	Floppy Disk	
7	LPT1 <<———	printer
8	Clock/Calendar	
9	VGA, (Active)	
10	Available	
11	Available	
12	Available	
13	80486 FPU	
14	Hard Disk	
15	Available	

Most I/O adapters "see" only the seven low interrupts and, thus, have no access to IRQ8-IRQ15. (Newer systems offer ports on board, and it is then a matter of how flexible their IRQ configuration is.)

MULTITASKING AND PRINTING

Under OS/2 more than one task can print *concurrently* on different printers, which comes in handy when there are many print jobs, particularly long ones involving graphics. A second printer, however, requires a second parallel port. (With one parallel port you still can use two printers, but not concurrently, and you must *manually* switch between them, which means you don't take advantage of multitasking. Manual switches are somewhat annoying—I keep forgetting to switch printers prior to sending output. Also, for lasers you need an electronic switch, as some mechanical ones may either damage the laser, or OS/2 may not work properly with them. The cheapest ones are in the $50-100 range.)



One possibility is to get an additional I/O card, which is inexpensive (around $15). OS/2 *requires* the second parallel device, LPT2, to use IRQ5 and, if it is available, you're all set. But if it's being used by another device, you face an *interrupt conflict.* For example, the ATI Graphics Ultra card—popular with OS/2 users because it supports the high-resolution 8514/A video mode built into OS/2, and has a graphics processor to which processing can be offloaded, thus accelerating multitasking performance—comes with a bus mouse that uses IRQ5 by default. The ATI installation software allows reconfiguring the mouse to use other *low* IRQs, but with a second parallel device using IRQ5, none of the seven is available.

If you already have an I/O card, using a second system slot—particularly a 32-bit EISA slot—just for a parallel port is wasteful. Moreover, for EISA systems, it makes more sense to use the ATI's newer, 32-bit version of the Graphics Ultra, which does not have a bus mouse (see below).

Another possibility would be for a second parallel device, LPT2, to share an interrupt level—here, IRQ7—with LPT1. Sharing means that two devices can use the same IRQ *simultaneously.* But the ISA bus does not support interrupt sharing; the EISA bus permits it, but

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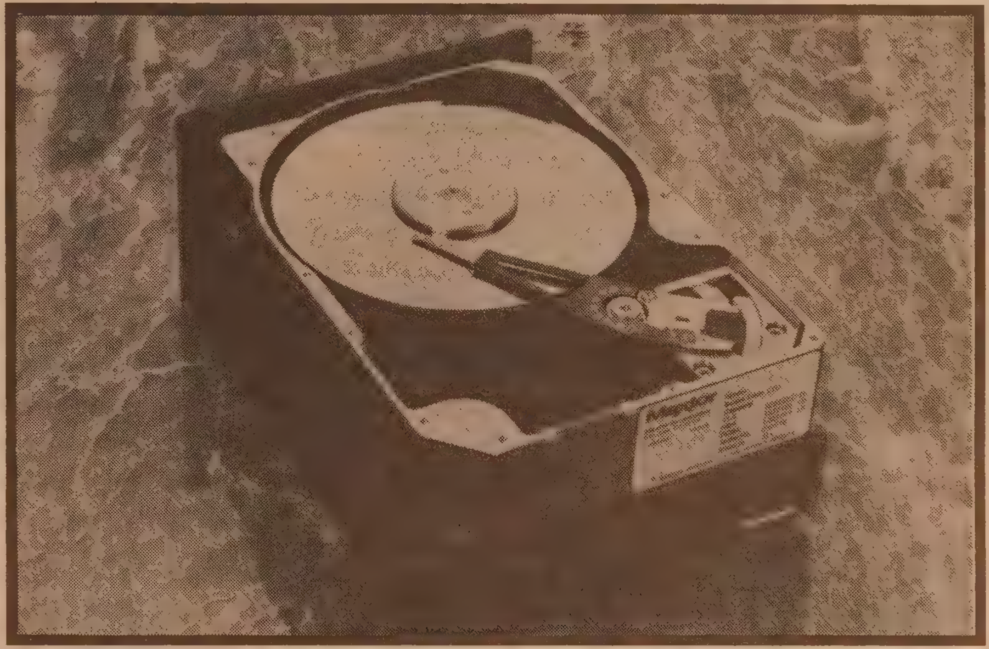

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ISA cards cannot take advantage of it, and there are no EISA-specific I/O cards.

Nevertheless, OS/2 allows print jobs to be sent to either LPT device when the other is idle, even if both use IRQ7. And it can even use a time-slicing trick to switch between jobs sent to both LPTs simultaneously. This solution is free, but will affect performance, and depends on the quality of the parallel port implementation on the I/O card (older, cheaper ones may not allow it).

MULTITASKING AND COMMUNICATION

DOS and Windows fax software can run as background tasks, but do not take advantage of OS/2's multithreading capability. And with the average fax hardware, the background processing is done by the system's CPU, which must handle multiple foreground tasks too. This can tax performance for all tasks.

Those who want to take true advantage of OS/2 can opt for the Intel SatisFAXtion/400 internal faxmodem. This is currently the only product with a built-in 8088 processor, to which fax processing is offloaded, releasing the system CPU to other tasks. It is directly supported by FaxWorks, 32-bit multithreaded fax software for OS/2. The up-to-14,400 *fax* modem uses the high IRQ10 which, as shown above, is usually available. The 14,400 *data* modem implements its own serial port with a data buffer similar to that of the 16550 UART. It can be set as any of the four COM ports, but for all practical purposes the options for IRQs are limited to only IRQ3 or IRQ4.

ATI's newer Graphics Ultra Pro video card—highly recommended for OS/2, particularly after the 32-bit drivers become available later this year—uses the address of COM4, in which case only COM1, COM2 and COM3 are available.

Now, if you have a serial mouse, you can connect it to serial port COM1 using IRQ4, configure the SatisFAXtion as COM2 using IRQ3. The following two-printer setup takes good advantage of OS/2:

IRQ USAGE

0	System Timer	
1	Keyboard	
2	[Cascade]	
3	COM2 <<———	SatisFAXtion data modem
4	COM1 <<———	serial mouse
5	LPT2 <<———	printer 2
6	Floppy Disk	
7	LPT1 <<———	printer 1

But suppose you are upgrading from another faxmodem, and want to keep it operational until the SatisFAXtion is installed and works smoothly (highly recommended!). With an additional modem—and two phone lines, of course—you can even multitask communication sessions, e.g. accessing CompuServe and MCI Mail concurrently!

You need a third serial port to do this, but in this case all low IRQs are being used and, as explained above, they are not sharable.

16-BIT I/O ADAPTERS

The most logical solution is to gain access to the high interrupt levels, IRQ8-IRQ15, several of which—depending on what other hardware you are using—are available. The average I/O adapter does not permit this because it is usually an 8-bit card. But 16-bit I/O adapters can access the high IRQs; for some reason, however, they have been slow to materialize. This is changing with the increased prominence of multitasking environments.

One example is Quatech's Dual Parallel Printer/Dual RS-232 Serial Adapter, the DSDP-100, shown in Figure 1. It provides, as its name indicates, two parallel and two serial ports. As a 16-bit adapter, the DSDP-100's serial ports can be configured to use available interrupts from IRQ2 to IRQ15. To avoid addressing conflicts that may be caused by other hardware, the base I/O address of each port is also configurable. The factory default configuration is:

PORT	ADDRESS	IRQ	ENABLED?
Serial A	3F8	4	Yes
Serial B	2F8	3	Yes
Parallel A	378	7	Yes
Parallel B	278	5	Yes

The parallel port setup is compatible with the ISA/EISA standard and OS/2 requirements, and needs no change. Depending on your hardware, even the serial port default setup may be acceptable as is, e.g. if, instead of the SatisFAXtion, you opt for an external faxmodem, which you connect to serial port B.

But if you go for the internal SatisFAXtion, serial port A can remain at the default setup as COM1 (for the serial mouse), but with the SatisFAXtion as COM2 using IRQ3, serial port B must be configured as, say, COM3 at its standard address (3E8), to use the next available high IRQ: 11. This can be straightforwardly and easily changed using jumpers and switches, as per the clear instructions in the manual.

Then specify this non-default setting in OS/2's CONFIG.SYS file, as follows:

```
DEVICE=D:\OS2\COM.SYS (3,3E8,11)
[i.e.COM, I/O Address, IRQ]
```

The IRQ usage is now:

IRQ USAGE

0	System Timer	
1	Keyboard	
2	[Cascade]	
3	COM2 <<———	SatisFAXtion data modem
4	COM1 <<———	serial mouse
5	LPT2 <<———	printer 2
6	Floppy Disk	
7	LPT1 <<———	printer 1
8	Clock/Calendar	
9	VGA, (Active)	
10	$INTELVA <<———	SatisFAXtion fax modem
11	COM3 <<———	external modem
12	Available	
13	80486 FPU	
14	Hard Disk	
15	Available	

which still leaves you three IRQs free, in case some future hardware causes problems.

The best things are simple, and the DSDP100 is no exception. It comes with a special cable and a short manual. One end of the cable has a D-62 connector which plugs into the card. The other end is a hydra with four D-25 connectors, for two serial and two parallel devices (extenders may be required by devices not close to the system). Only the first several pages of the manual need to be read by an end-user.

ADDITIONAL COMMENTS

At high data rates, serial ports that use the 16550 Universal Asynchronous Receiver/Transmitter (UART) chip are highly recommended, because the chip implements a data buffer that reduces processing overhead, and maximizes performance for high transmission rates, and multitasking environments. OS/2 communication drivers recognize and exploit the 16550 UARTs. But many modems and older DOS communication software may not support high data rates; even when they do, most older and cheaper serial ports, which use the older, bufferless 16450 UART chip, inhibit performance. For external modems, make sure your serial ports are configured with 16550AF UARTs. Quatech's DSDP-100 can be so configured upon request.

For most OS/2 (and DOS) users 16-bit adapters will let you get good performance from OS/2, avoid OS/2's fuss over some of the older and cheaper I/O cards, and obviate the need for manual switches or interrupt sharing—desirable, since there is no standard for such sharing, OS/2 does not support it, and there are practical limitations to running a large number of 14,400 bps modems on one interrupt line. ■

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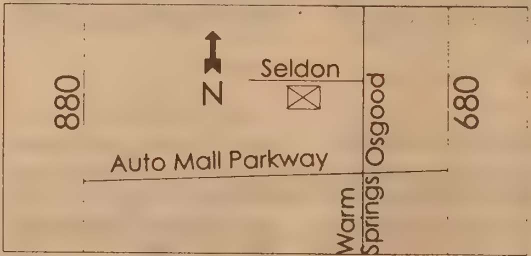

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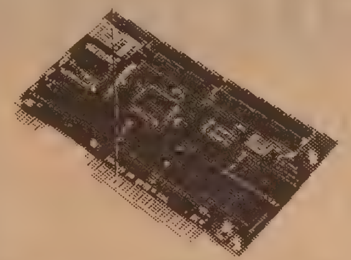

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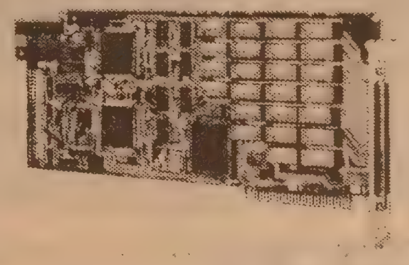

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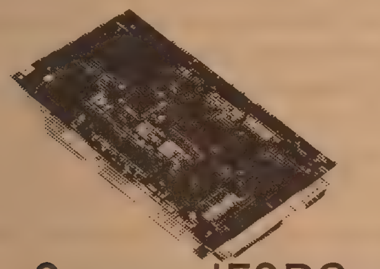

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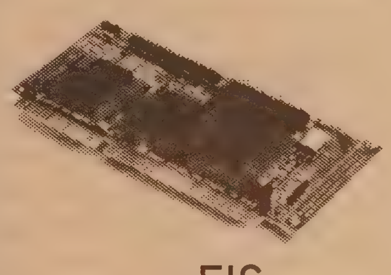

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Wireless Data Communications

What's Hype, What's Not

BY NORRIS PARKER SMITH

Remember two things in considering the current state of wireless data communications.

- **A great deal of money is being spent on a market that now barely exists: the wireless transmission of data from one computer to another.**
- **Right now, almost no one is really ready for mass-market wireless data transmission.**

THE INVESTMENT/HYPE FACTOR

Several aggregations of large, powerful companies are betting lots of cash on the assumption that, within a few years, huge numbers of people will discover a need for wireless data communications. As they spend all this money, they attempt to make this prospect seem as attractive—and imminent—as they can.

At gatherings of the faithful, like a recent presentation at the InterOp trade show in Washington, forecasts of potential customers into the tens of millions are quoted with a straight face. (This compares with current figures for US users of other wireless technology: the Yankee Group estimates that about thirteen million are hooked on cellular phones; fifteen million subscribe to pager services; twenty-three thousand use mobile computers, and two thousand use personal digital assistants. This survey anticipates 795,000 mobile computers and 289,000 users of personal digital assistants in 1996.)

Two contrasting philosophies of computing vie for portions of these presumed future riches. The first consists of conventional sit-down keyboard-based systems (or condensed laptop/palmtop versions of the same familiar input-output strategy).

Many users of ordinary computers are mobile: salespeople, repair technicians, police officers, taxidrivers, journalists, field geologists, long-distance truck drivers, delivery companies, and many others. This is, on the whole, a blue-collar or in-the-trenches white-collar market.

Currently, these workers spend their lives searching for a telephone, using inefficient, old-fashioned radio systems, or tying up someone on the other end while long strings of data are dictated over the phone.

On the other side, computer companies in particular have high hopes for compact new devices, aimed primarily at mid- to upper-level white collar users who hate to be bothered with keyboards and are always on the run. (Promotional videos usually show a photogenic executive, tie loosened, proceeding through a crowded office, brandishing his hand-held gadget, coping with crises without slowing down; or the same person, now trenchcoated, hurrying to catch a plane while remaining in wireless control of everything back at the office until the engines begin to turn).

The mobile manager concept is designed to depend upon wireless transmission, a requirement so the loping executive doesn't have to stop in mid-stride to plug in when the need to communicate strikes. These projected gadgets (none is a real product yet) are referred to as Personal Data (or Digital) Assistants or Personal Intelligent Communicators (known collectively as PDA/PICs). Apple's often-announced, often-postponed Newton is the best-known PDA/PIC.

> ***The mobile manager concept is designed to depend upon wireless transmission, a requirement so the loping executive doesn't have to stop in mid-stride to plug in when the need to communicate strikes.***

The radio signals generated by either of these two computational strategies have to be detected, collected, moved, and delivered. Many communications companies ogle this potential market, in which margins are expected to be fatter than in ordinary regulated voice service, or even conventional cellular service.

Several sorts of transmission technology are vying for position for the anticipated increase in wireless data traffic.

The cellular telephone companies are now upgrading their capacity to handle data more efficiently, to augment their bread-and-butter voice traffic. Newer, smaller firms specializing in data transmission, using a technology that differs somewhat from cellular nodes, are reaching for customers right now.

Broadcast systems like Skytel, which use pager technology, are gestating data-transmission services. Oracle, the database giant, is seeking regulatory approval for an even more ambitious, longer-term broadcast strategy.

The long list of major computer and electrical equipment companies fascinated by wireless data transmission includes AT&T, IBM, Matsushita, the Scandinavian conglomerate Ericsson, Motorola, and Apple. Several, notably Motorola, are participating actively in several computing and transmission technologies simultaneously.

Some of these companies—especially Apple—expect to navigate these unfamiliar seas on their own (although even Apple has turned to Japanese partners.) Others are using technology developed by smaller companies, like General Magic and EO, that have yet to introduce actual products but have already been favored by their wealthy sponsors with funding and potentially-lucrative contracts.

THE MARKET'S NOT THERE YET

The technology remains immature, although parts of it should become usable on a fairly broadscale during the next year or so. Other parts, especially wireless transmission packages suitable for PDA/PICs, could still take quite a while. More important, the major providers, from makers of computer systems to transmission companies, are still in a development, or even

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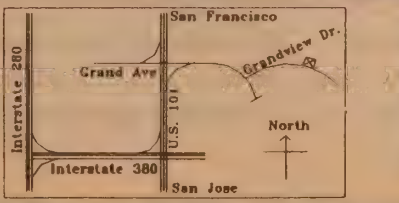

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experimental, mode. Their marketing plans, pricing—even the level of awareness within their own organizations about data transmission issues, equipment availability, and product potential—are still sketchy.

This is a transitional situation. The companies involved have the will and the resources to gear up for a widespread wireless data transmission market, and they could do so fairly swiftly.

Adventurers in unexplored wirelessland are advised to be persistent, well-informed, and prepared to spend some money.

Meanwhile, those interested in wireless data transfer for its own sake, or suspecting that it might be a neat solution for a current practical requirement, will experience the excitement of working with leading-edge technology.

They will also experience the frustration of trying to find someone, somewhere, who knows what's actually going on, and then discovering that the elusive someone is asking the inquirer for advice. Adventurers in unexplored wirelessland are advised to be persistent, well-informed, and prepared to spend some money.

So, what are the facts behind all those expectations?

PDA/PICS

PDA/PICs advocates talk simultaneously about a somewhat distant, Buck Rogersish future and about products slated to appear in stores as early as 1994. Some, perhaps including Apple's Newton, may be marketed by the end of 1993.

It will probably be a little longer, however, before Newton and its competitors will be able to communicate effectively via wireless links with one another and with deskbound computers. Wireless modem technology (in effect, a combination of a conventional modem and a radio transceiver) is just beginning to reach consumers on a moderately large scale.

There's a lot of work to be done before wireless modems are reduced to a size compatible with a PDA/PIC—the whole device is expected to be roughly the size and weight of a paperback book on steroids.

Nokia has just introduced a (very pricey) modem able to fit into the credit-card-sized slots on palmtops and personal organizers. Finding space for the radio components is, however, another matter. Additional technical issues, like interference between the radio and the tiny computer it cohabits with, must also be overcome.

DATA TRANSMISSION: THE CURRENT STATE OF THE ART

Transmission companies seeking the wireless data market fall into three categories: specialized providers that currently offer real services; a cellullar consortium, on track to deliver improved service for data customers; and broadcast systems, waiting in the wings.

Companies specializing in data transmission have already come to market and would love to seize a part of the total revenue before the cellular crowd has geared up.

ARDIS, a collaboration between IBM and Motorola, grew out of a long-standing project to provide wireless data reporting for IBM's sales force. RAM, an established supplier of conventional radio telephone services for users like field geologists, has joined with BellSouth to form RAM Mobile Data.

RAM Mobile Data got to market first with a functioning wireless modem, developed by Ericsson. The Ericsson technology, known as Mobitex, has already been installed in several European countries. Early this year, Ericsson announced a Mobitex modem called Viking Express—a real-life product that actually works.

For $995, the buyer receives a complete package: the wireless modem (about the size and weight of the familiar non-folding Motorola cellular phone, known in the trade as the brick) with a Hewlett-Packard full-keyboard palmtop that holds the software and serves to compose and store messages. The modem alone (which can be used with other portable computers) is $775.

Motorola now has a similar modem in extensive test and is expected to price it and launch it as a product within the next few months. ARDIS, whose current computer/transceiver looks like a shrunken Radio Shack Model 100 portable, will soon introduce a more up-to-date terminal.

Current by-the-byte pricing policies at both RAM (which markets its services through a contractor, RadioNet) and ARDIS favor relatively brief messages. Steady usage by, for example, an astronomer or geologist moving large data files from a temporary remote site, could become very expensive indeed. A consortium of cellular telephone providers who collectively reach almost the entire North American market is also moving aggressively toward wireless data communication. (The two Bay Area cellular providers, Cellular One, owned by PacTel and McCaw Communications, and GTE Mobilnet, are both members.)

The consortium, led by McCaw, is adding a new packet-based transmission technology, called Cellular Digital Packet Data (CDPD). It is intended to make it much easier to transmit data over the regular voice-oriented cellular infrastructure.

In effect, CDPD will enable cellular systems to transmit packets of data in the interstices between voice transmissions. The additional equipment required is relatively simple and inexpensive, so CDPD should offer an attractive return on investment for cellular providers—which could mean good service.

Once again, the target is 1994. This date is much firmer than the 1994 mentioned by PDA/PIC proponents, because the hardware and software required are evolutionary rather than revolutionary. A field test carried out between summer 1992 and February of this year tested the CDPD concept thoroughly.

The test was conducted in the Bay Area, with GTE and Cellular One collaborating. This experience should give the Bay Area an advantage when regional cellular companies begin beta tests with CDPD during the second half of 1993. A technical expert close to CDPD planning said that he expects deployment of CDPD "in all major market areas" by 1995, with "very significant rollouts" during 1994.

Currently, data transmissions over cellular facilities are charged at the usual per-

continued on page 234

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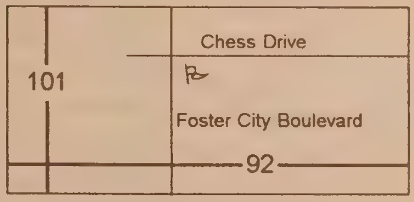

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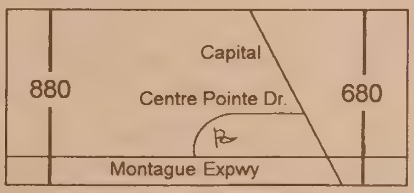

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The International Computer Professionals Association

Finding Jobs Overseas

BY CHRISTOPHER NEWTON

> "Apple and Microsoft have large numbers of Americans working in Europe, and several American companies actually make more money in the EC market than domestically."

When Don Radvan steps off the plane at London's Heathrow Airport, he will not head for Buckingham Palace or Piccadilly Circus. He's heading straight into a job as a NeXT programmer.

If he were an American citizen (he's Canadian) he would be eligible to make up to $70,000 per year tax-free. Some American software professionals are already doing that in Saudi Arabia.

Radvan will be working near what Londoners call The City. However, his odyssey can be traced to an organization headquartered in another place that its locals call the City: San Francisco.

The International Computer Professionals Association was founded in 1992 to help software technical professionals, programmers, project leaders, analysts, trainers, and salespersons to land jobs overseas.

"I replied to several ads in their journal *The Network*. That got me three interviews, which led to three offers," Radvan reports. "It was risky: I had to pay my own fare. But the recruiters were very amenable to my scheduling three interviews during the time I was there. All three jobs were London-based." Radvan got his job through careful preparation, discovery of a niche market, and using the ICPA. (Incidentally, beyond NeXT, the niche encompasses real-time financial software—options, futures, etc.)

ICPA Director Tony Rodriguez explains, "We want to be *the* network for international software professionals. It's not just for Americans; about half of our members already live in other countries. So we're available for someone in Hong Kong who wants to work in Kuwait; or for someone in Seattle who wants to work in France."

He is optimistic about the industry's outlook. "Software is the best industry to be in if you wish to work outside the US. Eighty percent of the software installed worldwide is American. Apple and Microsoft have large numbers of Americans working in Europe, and several American companies actually make more money in the EC market than domestically."

The ICPA grew out of Rodriguez's informal networking relationships.

He had been on a long contracting assignment in the health care industry in San Francisco. After the Loma Prieta earthquake of 1989, Rodriguez decided on a change of "seismic pace" and moved to Paris. After three months of resume-writing, cold-calling and intense effort, he landed a job—even without speaking much French.

After living three years in France, however, he acquired a fair amount of French, and began to realize that there might be a need for a more formal forum or network. Upon his return to San Francisco, he decided to put his experience to work for others. Thus was born the ICPA.

ICPA SERVICES

The ICPA offers several services.

•**International Career Hotline:** This service, free to members, answers questions about salaries, taxes, visa, and relocation issues.

•**Member Skills Database:** Members can post a profile of skills which the ICPA maintains and which is accessed by technical recruiters worldwide.

•**International Career Update Quarterly:** Gives an additional three hundred software assignments listings.

•**Subscription to *The Network:*** Two issues per month, typically containing 150 overseas job listings. Articles on working abroad and tips on taxes, visas, and work permits.

•**Discounts** on other services, such as resume translation, international mailing, and

Copyright © 1993 by Christopher Newton. All rights reserved. Christopher Newton is a systems analyst for an international lessor of shipping containers. He is fluent in Spanish and conversant in French, Portuguese, and German. He can be reached at (415)334-8336.

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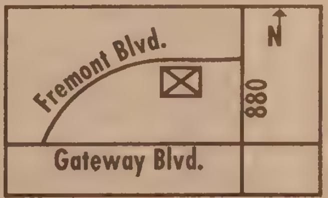

career counseling and job search service, are also available to members.

Membership is open to anyone with software industry experience and an interest in working internationally. Although it's not a requirement for membership, recruiters typically require applicants to possess at least three years of experience in their field. The membership is approximately a 50% male/female mix, and the age runs upward from mid-twenties.

THE IMMIGRATION ISSUE

Sue Ingle, a recruiter with IC Software based in Neuchatel, Switzerland, praises the ICPA and its candidates, and also stresses the importance of having at least one foreign language: "Given the choice between two candidates with equal technical skills, the employer will always decide in favor of the one with even basic French or German." She confirms that the market is hot now for people with C development skills, and in the RDMS world, Oracle is in demand.

She characterizes the difficulties of obtaining work and residence permits as "not insurmountable."

For Americans (and Australians) it is somewhat more difficult to work in an EC country, and somewhat easier to work in remaining EFTA countries, or Spain and Portugal (newer EC members). The recruiters advertising in *The Network* will assist applicants to obtain permits if they consider them well qualified.

Radvan agrees. "The recruiters and employers who list in *The Network* have already made the effort to find a national, or even an EC passport-carrying applicant. So you may have half the battle over in obtaining a work permit through the employer."

Since ICPA's advertisements have begun appearing in journals like *Datamation* and the *IEEE Spectrum*, Rodriguez says, "inquiries have gone up to five hundred a month."

HOT MARKETS: THE SKILLS IN DEMAND NOW

Don Radvan obviously found his NeXT skills to be in demand. The ICPA also lists these hot areas: C, UNIX, LANs, Sun workstations, telecommunications in general, Ingres, and Sybase.

WHERE THE JOBS ARE

Although one *Network* issue listed a position in Antarctica, most jobs are in more temperate climates. An analysis of Issue 18 (late October/early November 1992) shows the following destinations for advertised jobs:

Region	# of Jobs	Pct. of Total
Australia	23	15%
Europe	62	41%
Far East	24	16%
Latin America	3	2%
Middle East	12	8%
North America	16	11%

Additionally, ten jobs fell under the classification of "International" and constituted around 7% of the total; these were listings for consulting work where the destination was "overseas." (For this survey, African listings were combined with Middle East.)

The titles were varied and included the following: Systems Analyst, Consultant, Quality Assurance, EDP Auditor, IT Faculty, Project Leader, Software Engineer, Technical and Telecommunications Manager, Business Analyst, and Director of Sales.

TIPS FROM THE PROS

To make your international job search more productive:

•Learn another language (see box).

•Develop three years of experience in your preferred area.

•Study the niche markets: Get hold of overseas newspapers and/or job journals and examine frequently appearing listings. Look for evidence of shortages.

•Travel at least once to your target destination in order to familiarize yourself with the lay of the land before interview time. For example, a general rule of thumb is that French employers prefer a degree, while in the UK experience can outweigh the lack of one. In Germany and Australia the emphasis is mixed, with experience weighing slightly more with employers.

•Be adaptable among development environments. If your background is mainframe, acquire PC skills and familiarity with some software packages.

•Start now: be prepared to invest three months in your job search.

THE OUTLOOK

Rodriguez says that most developed countries already have people who can write code. "The demand will be from employers who want to go with state-of-the-art technology. A lot of that is American, so they want Americans who can help them get going quickly."

His other assessments of particular areas: "The eastern Europeans are junking their old systems and starting fresh, but capital shortages are making the going slow, in general. The emphasis is on building sales and marketing organizations and in about a year the demand will be more solidly established overall.

"Latin America is also in the phase of establishing vendor relationships and building marketing organizations. Some companies are anticipating NAFTA going through; others are hanging back.

"In the Far East there is a surprising number of vacancies in the educational field, from MIS instructors in the private sector to university professorships in Computer Science."

Overall, the trend is toward internationalization and globalization of software. Rodriguez sums up the mission of the ICPA membership: "For the truly curious, there is nothing more interesting than living—and working—in another country."■

GETTING STARTED

Contact for free information kit:
Tony Rodriguez, Director
International Computer
Professionals Association
2261 Market St., Ste. 309
San Francisco, CA 94114
Voice: (415)252-7467
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email: icpa@holonet.net

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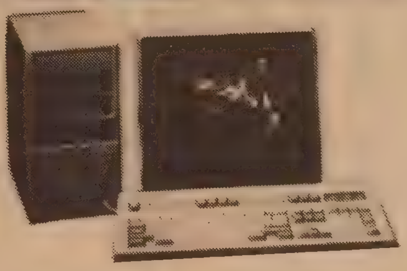

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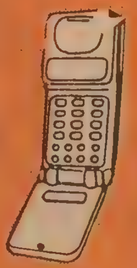

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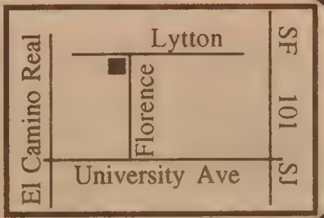

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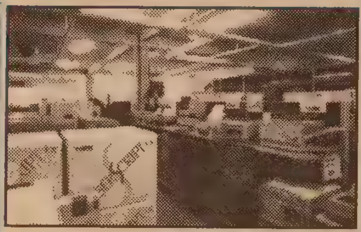

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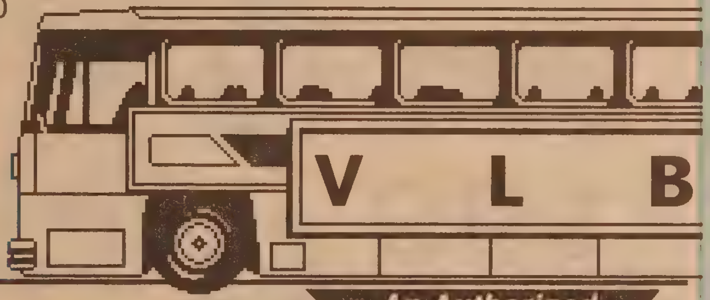

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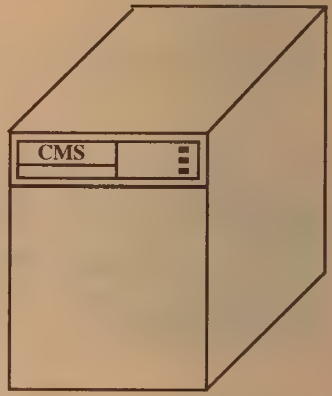

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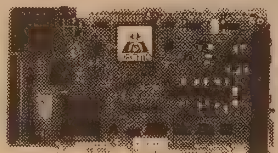

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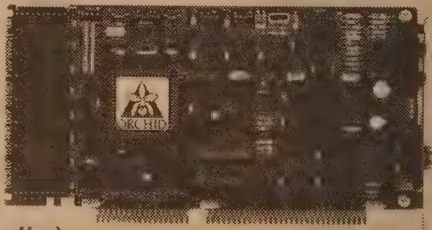

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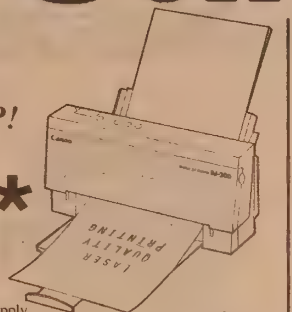

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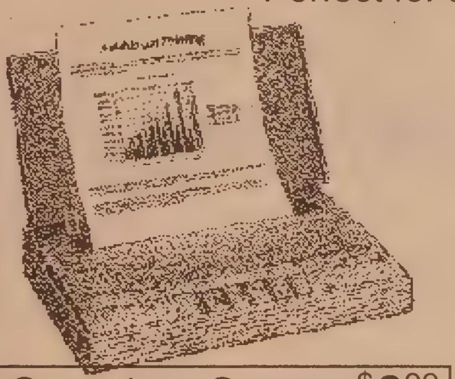

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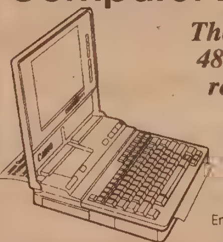

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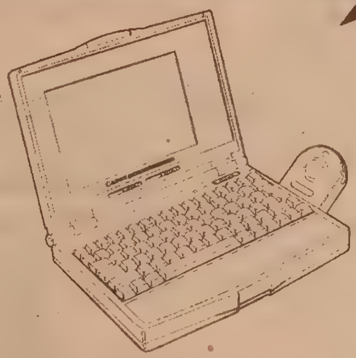

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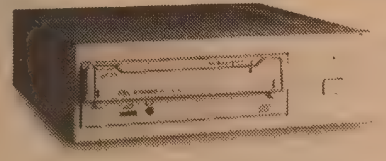

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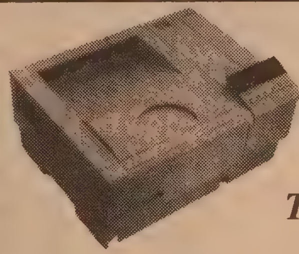

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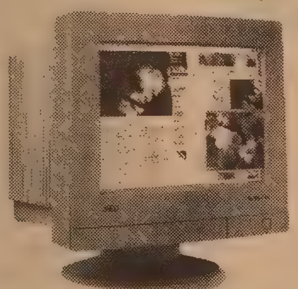

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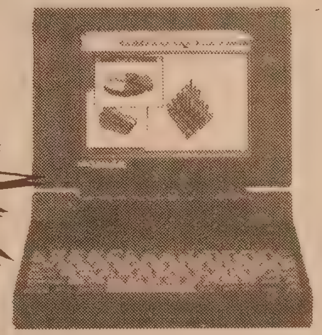

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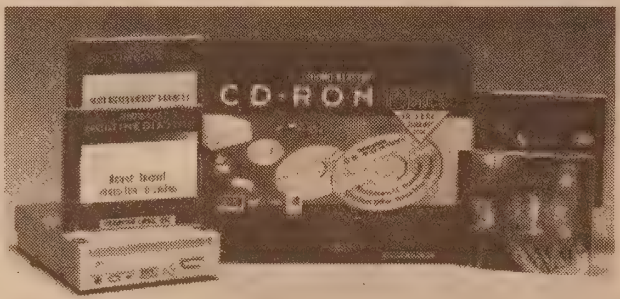

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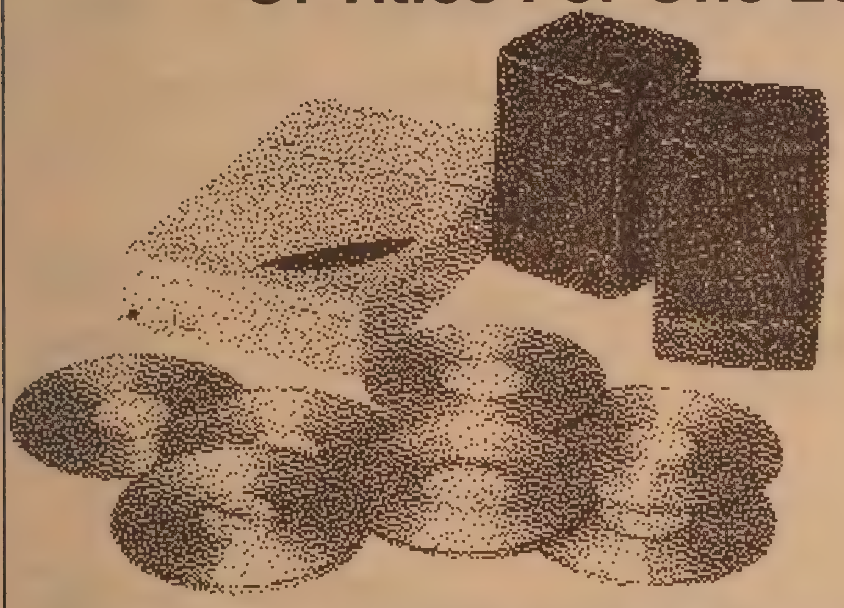

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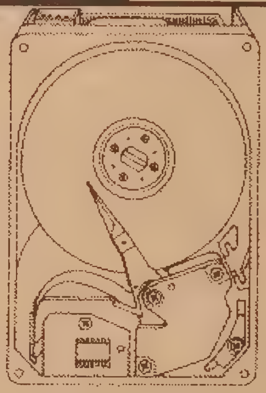

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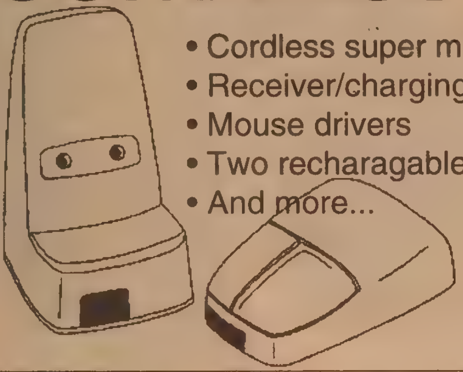

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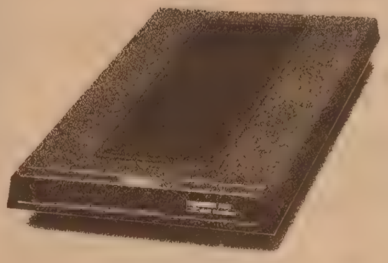

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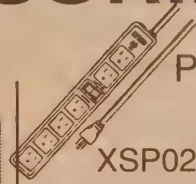

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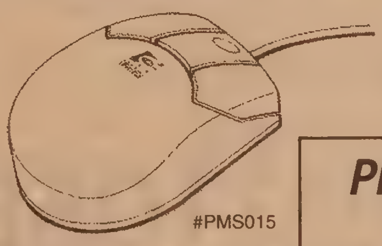

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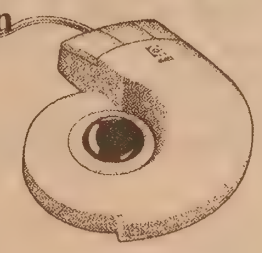

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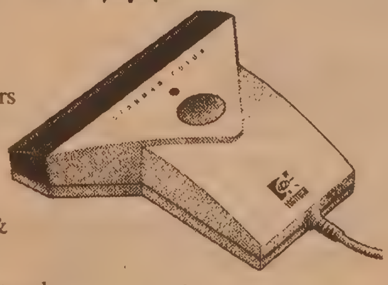

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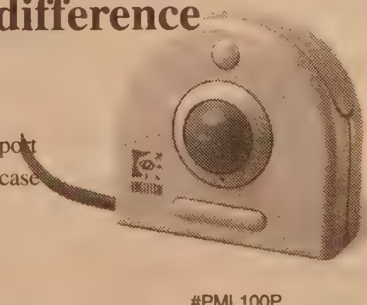

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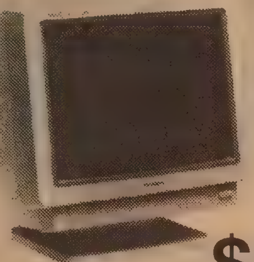

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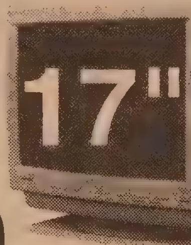

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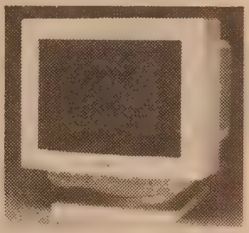

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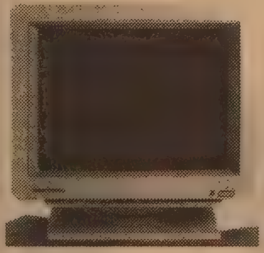

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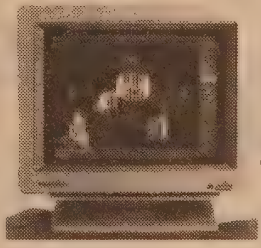

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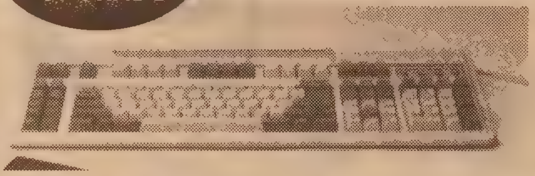

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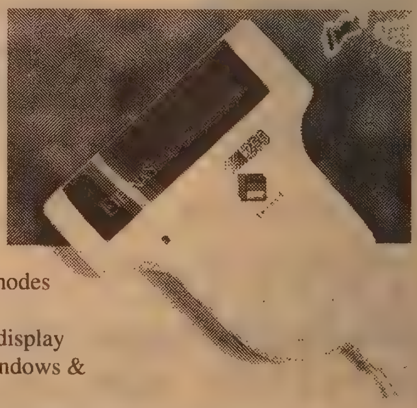

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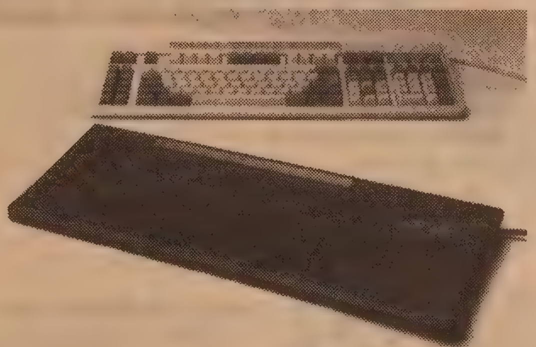

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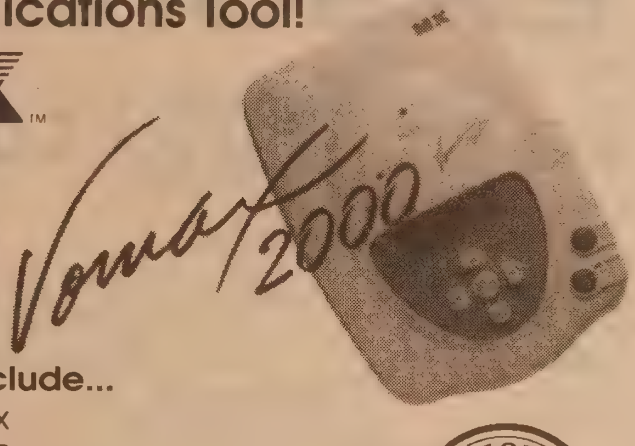

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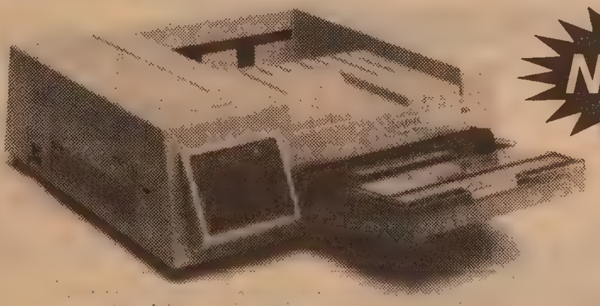

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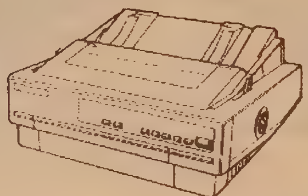

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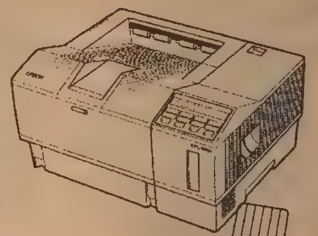

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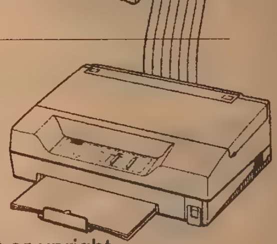

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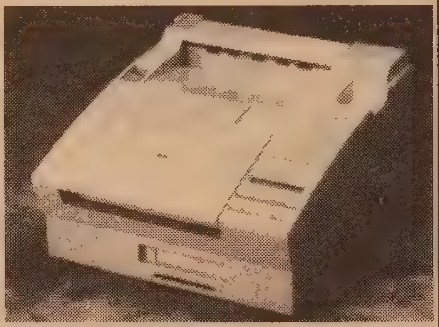

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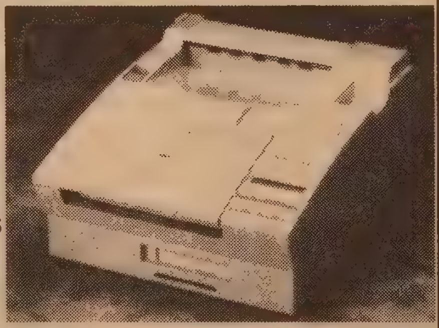

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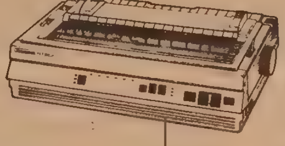

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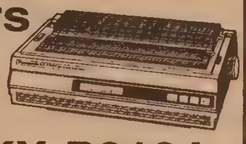

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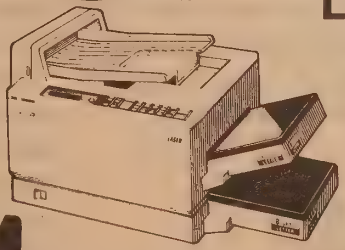

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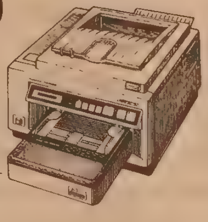

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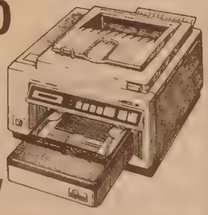

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Networks Cross Boundaries

The First Of A Two-Part Article Looking At The Development Of Communities On Networks, Or What Happens From The Combination Of Communication And Resource Sharing

BY JOHN S. QUARTERMAN

The point of computer networking is collaboration for business and pleasure. Networks are not just bits and bytes. Their combination of communication and resource sharing permits and facilitates the formation of places in the mind which, when used by enough people, become communities. People who write about networks often become fascinated with the technology (faster speeds and nifty services) or various pathologies (viruses, worms, crackers, and overzealous law enforcement agencies). The technology is necessary, and some of the pathologies appear to be unavoidable. But resource sharing, communication, collaboration, and community are why the networks exist in the first place.

> **Resource sharing, communication, collaboration, and community are why the networks exist in the first place.**

THE ARPANET AND ELECTRONIC MAIL

The basic function of computer networks is to transfer bits between computers, for use by humans. Bits alone aren't much use, so networks provide application services to their users. The earliest networks, such as the ARPANET (1969–1990, R.I.P.), were intended to be for resource sharing, which usually meant remote login and file transfer. A funding agency, such as ARPA (Advanced Research Projects Agency) could buy a few fast computers, put them at a few of the organizations it funded, and have other organizations access them over a network, using applications such as TELNET (remote login) and FTP (File Transfer Protocol).

ARPANET researchers quickly discovered they could use the network itself to communicate with each other. Electronic mail, email, had earlier existed on single machine timesharing systems, and it was extended to multiple machines on the ARPANET in 1972 or 1973. The exact date is uncertain; those who did it didn't realize the historical nature of the event. Now they know they were inventing a new form of communication.

The immediate reason for sending mail across a network to another machine was to avoid telephone tag. ARPANET researchers were scattered across the United States and elsewhere, and wanted to exchange messages about their research without having to catch each other across several time zones and different schedules. Mail quickly became a kind of glue that tied together the ARPANET Working Group.

That group of ARPANET researchers published Requests for Comments (RFCs), which were technical and other papers about the network, its protocols, and various other subjects. RFCs have always been published online, for retrieval by FTP, email, or other means. Many readers do comment on RFCs, often through email. Mail, FTP, RFCs, and other services of the ARPANET helped support ARPANET research from its early years, as well as other kinds of research.

Mail caught on for personal uses very early, as well; it was just as useful for communicating about wine tastings as about bit twiddling.

MAILING LISTS

By 1977, mail had spawned mailing lists, such as SF-LOVERS, which is about science fiction. You can send ordinary email to multiple people, but then you have to remember all their addresses. If any of your recipients want to respond to the group, they also have to include all the addresses. This gets messy for even somewhat large groups. Instead, you can set up a mail alias, such as SF-LOVERS, so that you can send mail to that one alias and have software redistribute to everyone on the list. Ongoing discussions are made much easier by mailing lists. SF-LOVERS, for example, is still going on, after more than fifteen years.

Mailing lists are sociologically different from ordinary email. Because lists are ongoing and can support large numbers of participants, they often develop recognizable characteristics. The topic of a list attracts people interested in it. Biologists aren't likely to subscribe to a list about the petroleum industry, for example. Fortunately, there are thousands of lists available these days.

USENET NEWS

SF-LOVERS is also distributed as a USENET newsgroup these days, called rec.arts.sf-lovers. USENET newsgroups developed, starting in 1979, in imitation of ARPANET mailing lists, but for people and organizations that couldn't get ARPANET access. USENET news was originally supported over the dialup UUCP network, which had begun about 1978, when the UUCP protocol was distributed with the Seventh Edition of the UNIX Timesharing System.

Newsgroups are much more efficient than mailing lists. One copy of a mail message goes to every recipient, whether you type each address or the message is redistributed through a mailing list alias. But a copy of a news article goes to each computer, not each person. People who want to subscribe to a newsgroup, as news discussion topics are called, first make sure their computer receives that newsgroup. Then any person using that machine can read that newsgroup.

This increased efficiency permits much larger discussion groups. Some newsgroups have more than one hundred thousand readers, any of whom can also post. About two million people read USENET news worldwide today.

Mail, lists, and news are used for commu-

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John S. Quarterman is editor of Matrix News, *a monthly newsletter about contextual issues crossing network, geographic, and political boundaries, and is Secretary of Matrix Information and Directory Services, Inc., of Austin. He is the author of* The Matrix: Computer Networks and Conferencing Systems Worldwide, *Digital Press, 1990, and coauthor of* The Design and Implementation of the 4.3BSD UNIX Operating System, *1989;* UNIX, POSIX, and Open Systems: The Open Standards Puzzle, *1993;* Practical Internetworking with TCP/IP and UNIX, *forthcoming in 1993, both from Addison-Wesley. Quarterman is a partner in Texas Internet Consulting (TIC), which consults in networks and open systems, with particular emphasis on TCP/IP networks, UNIX systems, and standards. He can be reached at: MIDS, 1106 Clayton Lane, Suite 500W, Austin, TX 78723. Email: mids@tic.com.*

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nication, and are thus communication protocols. The formal term used in the computer science literature is Computer Mediated Communication (CMC), but we'll just say communications, since we already know we're talking about the use of computers.

THE INTERNET

In 1977 an experiment began with a set of networks that all used the same internetworking protocols to communicate. These networks were therefore an internet, and this particular internet was called the ARPA Internet. The protocols were called TCP/IP, after two of them: TCP (Transmission Control Protocol) and the key protocol, IP (Internet Protocol). As of 1 January 1983, all computers and networks that connected to the ARPANET were required to use TCP/IP, and that was the beginning of what we now know as the Internet.

Note the definite article (the) and the capital I. There are other internets, and many of them use TCP/IP. But the Internet is a particular internet: the largest one. If you can use FTP to retrieve a file from a host such as ftp.psi.com, ftp.uu.net, or ds.internic.net that is on the Internet, your host is, too. If you can't do that, but you can exchange electronic mail with hosts on the Internet, you're not on the Internet, though you are in the Matrix, which we will discuss later.

The ARPANET served as a backbone network in the Internet for some years, but was retired in 1990. The Internet continues many logistical mechanisms started on the ARPANET, including mail and RFCs. Technical working groups associated with the Internet each have a mailing list, as well.

The Internet today has grown far beyond ARPA, the US government, or any government. It has more than ten thousand networks communicating, more than 1,500,000 computers connected, and probably more than ten million people, in more than forty countries and all seven continents, including Antarctica. The numbers of networks, hosts, and users in the Internet are growing exponentially, approximately doubling each year. Ironically, an obscure Cold War experiment has led to the most widely used networking technology and the largest computer network in the world. Those tax dollars were put to good use....

NEW SERVICES

Until recently, the main application services of the Internet were the traditional Big Three from the 1970s: file transfer, remote login, and mail. Fast LANs in the Internet used more sophisticated versions of file transfer and remote login than the old FTP and TELNET protocols, and some of these applications, such as the X Window System, came to be used rather widely across the wide area links of the Internet. USENET news started on the dialup UUCP network, but came to be used on the Internet, as well. In fact, most machines that support USENET news are now on the Internet.

In the last few years, searching and indexing services such as archie (which indexes FTP archives), WAIS (Wide Area Information Servers, which indexes documents), and gopher (which provides a menu front end to various other services) have sprung up on the Internet. The general topic of these services is sometimes called resource discovery. These services make collaboration even easier and more accessible to more people.

Network size requires innovative solutions for resource discovery. However, that same size facilitates those innovative solutions. Consider archie, which collects indexes of files available from anonymous FTP servers. It was written by a few people at McGill University in Montreal, and logged 120,000 uses in its first seven months. Also by the end of that period, most of its usage from 5 pm to midnight Eastern time was from Europe, prompting the installation of a European archie server. A dozen public archie servers now assist users around the world, and a dozen or so more serve specific countries. Thus a few people in one country can affect usage patterns for a whole network by providing a service that people all over the world want.

CHARGING

Far too much of current networks and networking technology is supported by volunteer or quasi-volunteer labor. As networks expand, they must be made to support their own weight, or, rather, their users must be persuaded to support them.

Some simple solutions are practicable now. The archie folks are now incorporated as Bunyip, Inc., and charge for copies of their server software. Credit cards are a convenient way of handling relatively small amounts of money for newsletter subscriptions. Credit cards also handle currency conversion, making overseas subscriptions easy. But what is really needed is an online bank.

THE MATRIX

Meanwhile, many other networks, such as UUCP, FidoNet, and BITNET, still have mail and news as their basic services, sometimes plus file transfer. Many commercial services, such as CompuServe and MCI Mail, exchange mail with other networks, but nothing else. Many large companies have extensive internal TCP/IP internets, but deliberately firewall them from the Internet, permitting only mail and news to pass in and out.

Mail is the least common denominator service, and is available among the most networks. All the networks and computers that interchange electronic mail together form the Matrix. As many as twenty-five million people probably use the Matrix, and the number is growing exponentially.

PLACES, COMMUNITIES, AND BOUNDARIES

Mailing lists develop on almost every network that has mail, and any user of any network in the Matrix can use mailing lists based on networks such as BITNET or the Internet. USENET news or things like it is distributed on numerous networks. Mailing lists and newsgroups often collect regular readers and posters. Such participants come to consider these online forums to be places. Often they use resource sharing services such as file transfer to share information related to the forum, thus reinforcing the sense of place. If file transfer using application protocols such as FTP isn't directly available, files can often be delivered instead by mail.

Some such online places facilitate previous communities, or even form new ones. In fiction, such as William Gibson's very influential science fiction novel *Neuromancer*, sophisticated visual interfaces often seem to be required for online places or community, sometimes called cyberspace. But millions of present-day Matrix users can tell you that email alone is enough. Other services and interfaces are often useful, but they aren't essential to a sense of place or community.

These networked communities are different in some ways from other communities. By the nature of the services and networks that support most of them, they are distributed, asynchronous, and recorded. They are also diverse, and many members of them say they are egalitarian. Many networked communities lead to interactions among their members by other means, such as traditional media like telephone and paper post, and especially by travel for personal meetings. Perhaps it would be better to say that the networks facilitate communities.

These places and communities can cross time and space in ways that are uncommon among traditional communities. Computer network protocols are designed so that any pair of computers with the same protocols and a connection can transfer bits, regardless of where they are. This simplicity of abstraction makes it easy for computer networks to cross many kinds of boundaries. The utility of computer networks, partly derived from this ability, ensures that networks do, in fact, cross boundaries. ■

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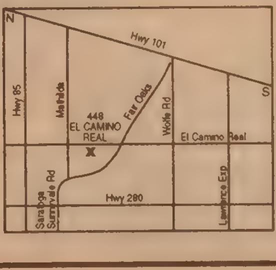

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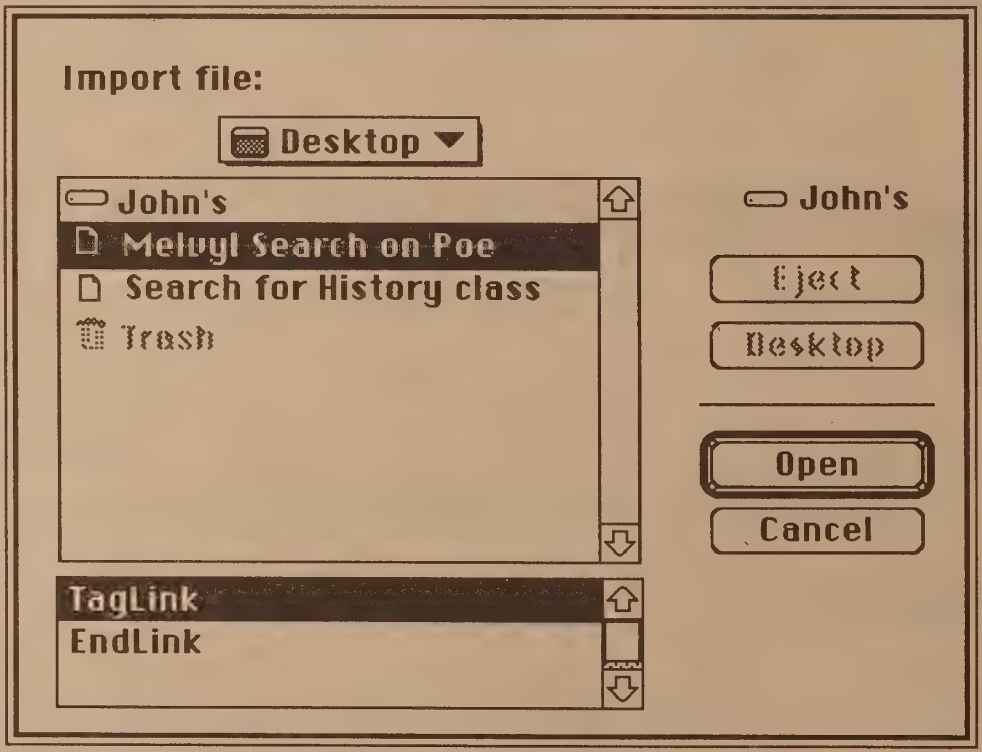

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A LOOK AT ENDNOTE

"For me EndNote has really been a godsend," says Robert Westfall, a medical researcher who uses the program to prepare his medical papers for publication. "Before I started using the program, I spent a lot of time reformatting bibliographies in the papers I wrote. Now I can use the time I save for research and work. EndNote lets you create customized bibliography formats that you can store in your computer and call up whenever you need to use that specific style. Since many of the medical journals I publish are in Canada and most of the publications there use the same form, I store this bibliographic structure as a format and call it up with a few keystrokes. Creating a bibliography for my papers used to be really a chore. Now I don't have to worry about it."

Westfall uses EndNote on-the-fly as he writes a paper or an article, inserting citations and compiling a bibliography that he can delete from or add to at any time. "I can call up the bibliography and edit it right in the middle of writing a paper as I move things around. When I'm finished and I decide to make major changes, all the bibliographic information is waiting right there in my database and I can utilize it whenever I want."

EndNote scans a document created your word processor for any citations yo have inserted into the text. The program compiles a bibliography using the information in your database of authors and documents. EndNote then produces a copy of your paper with the bibliography and all citations properly reformatted to fit whatever style you choose. Stored formats of the bibliographic styles of major journals such as *Science*, MLA (Modern Language Association) or *Nature* can be easily accessed to give you an easy way to reformat your bibliography to fit the styles of the various journals. Niles & Associates has released an enhanced version of the EndNote program known as EndNote Plus which features additional sorting and searching capabilities as well as the ability to reformat documents created by WordPerfect and Microsoft Word for Windows.

If your reference database was originally created by software programs other than Pro-Cite, Refer or BibIX, you'll need to translate that database into a form that EndNote will recognize as a Pro-Cite or Refer format file. Most databases have an export command that will create a quote-delimited output file (e.g. COPY TO ... DELIMITED command in dBase). You must set up your reference database so that the fields occur in the proper order, including the "unused" fields. Then you can dump your database to a delimited file and EndNote will automatically read the file.

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Marshall Smith is a San Francisco-based writer whose work has appeared Bay Area publications including the San Francisco Chronicle and the Whole Earth Review.

continued on page 232

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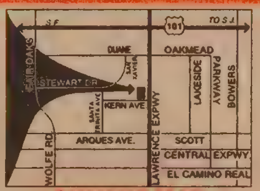

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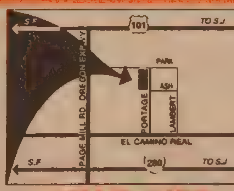

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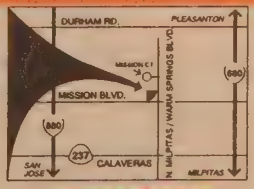

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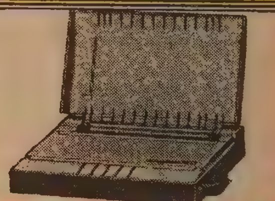

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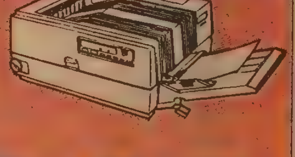

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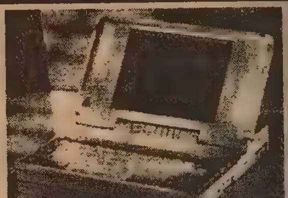

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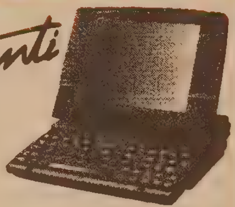

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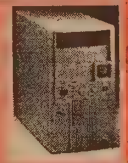

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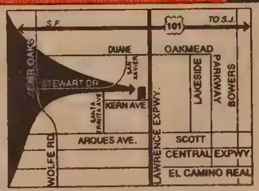

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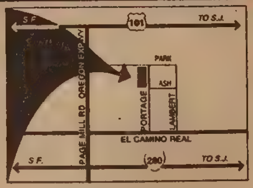

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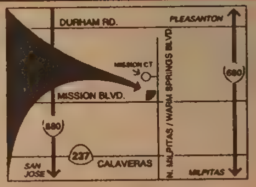

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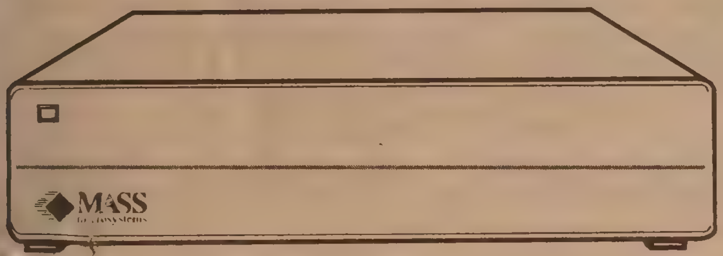

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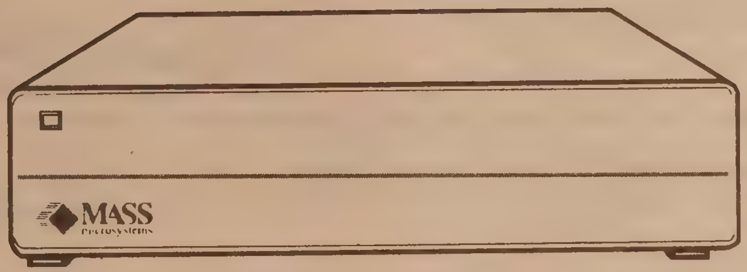

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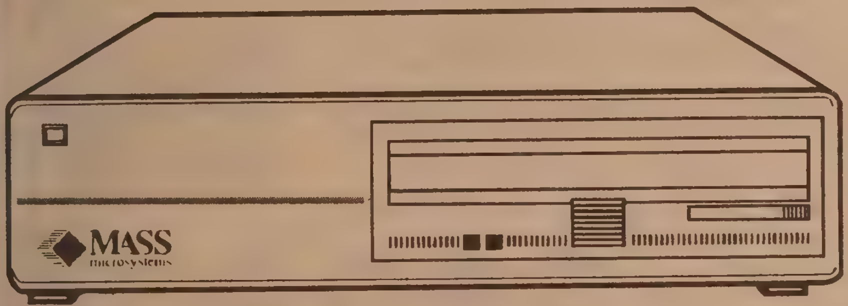

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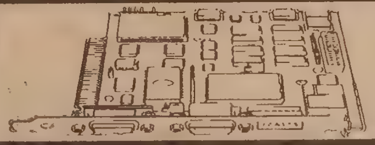

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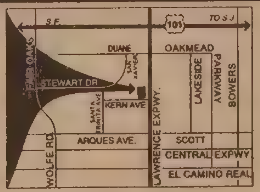

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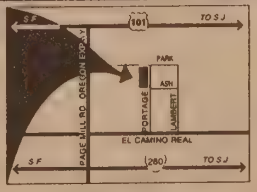

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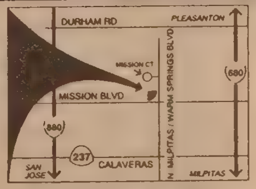

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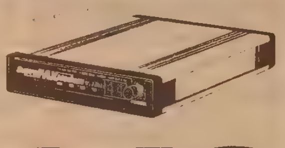

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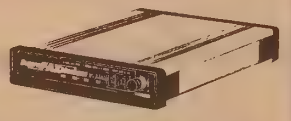

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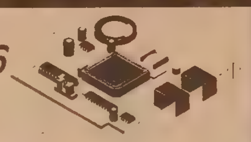

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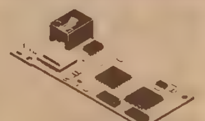

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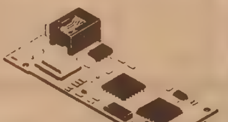

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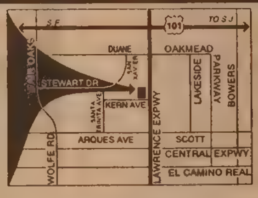

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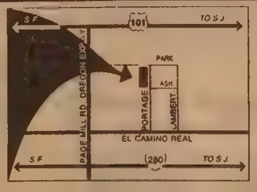

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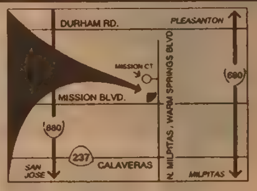

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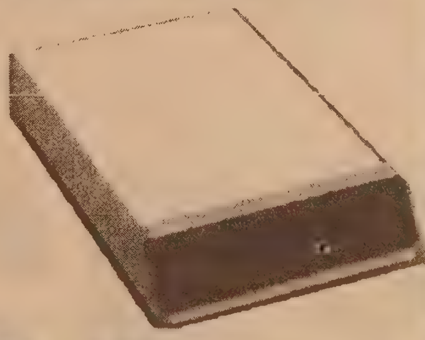

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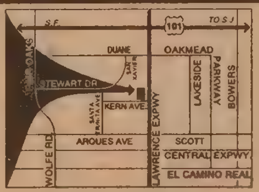

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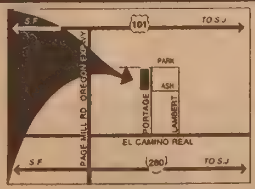

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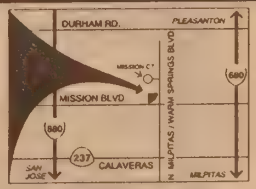

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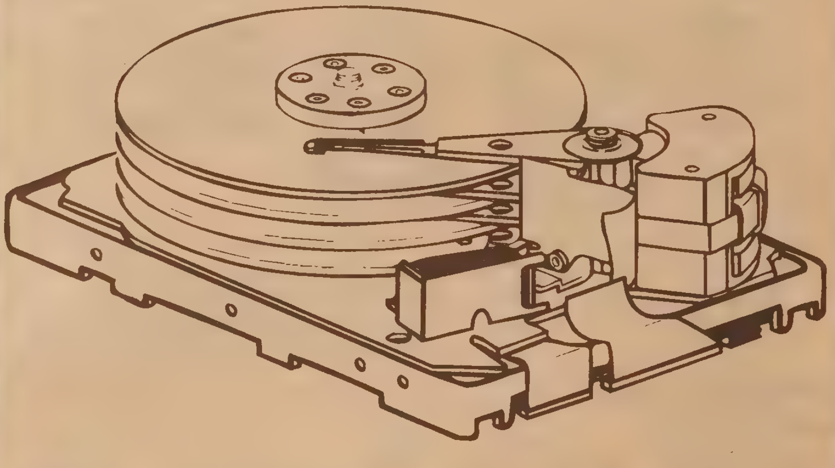

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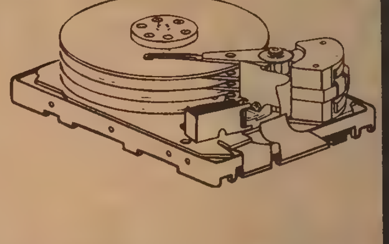

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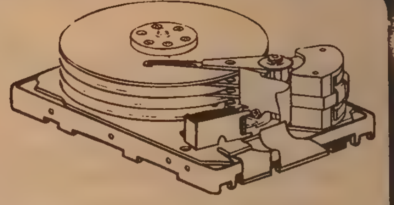

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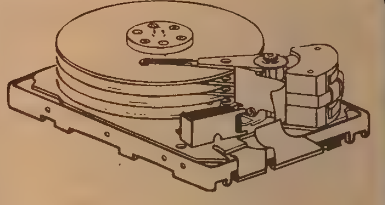

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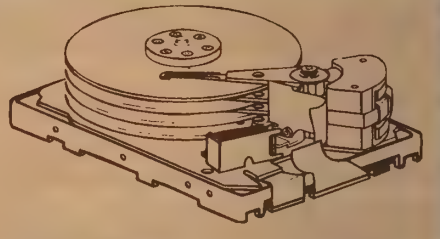

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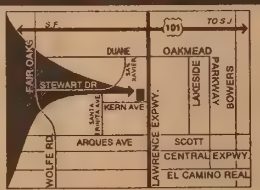

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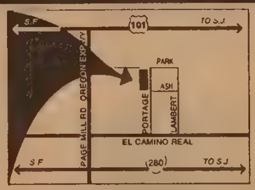

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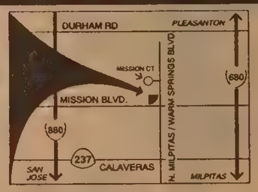

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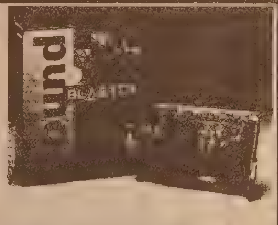

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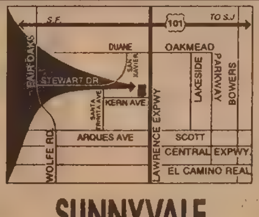

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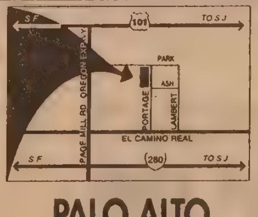

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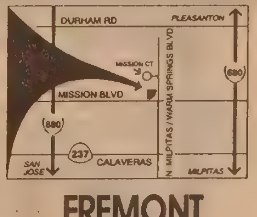

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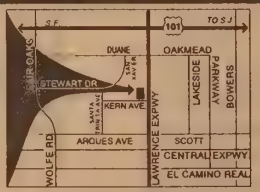

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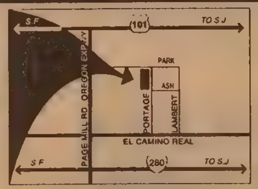

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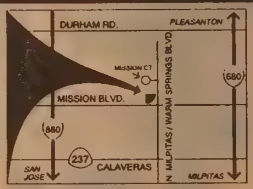

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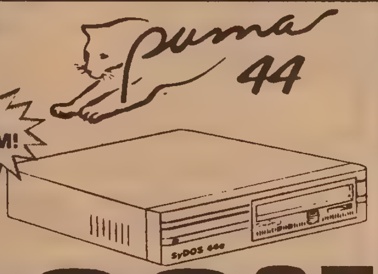

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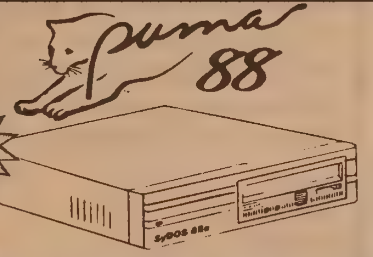

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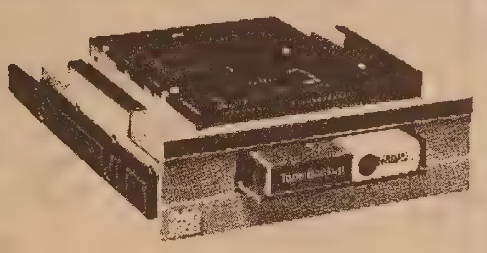

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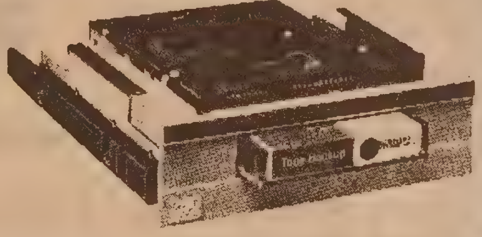

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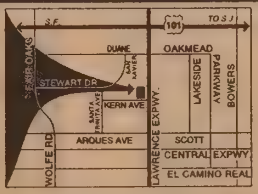

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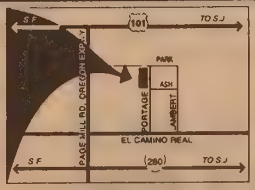

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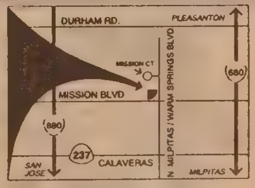

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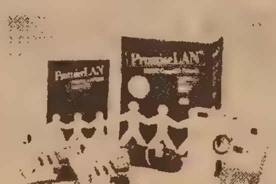

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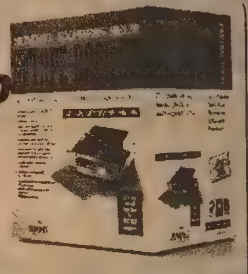

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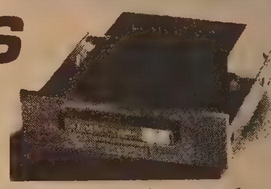

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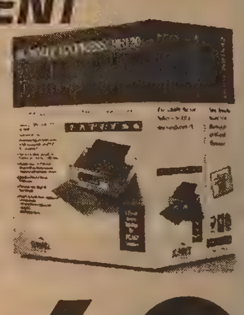

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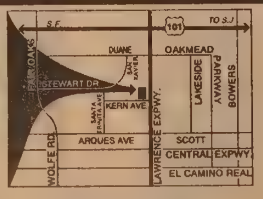

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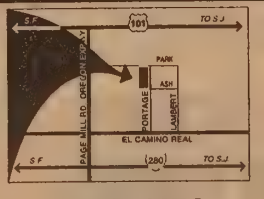

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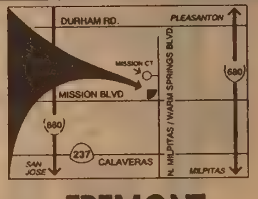

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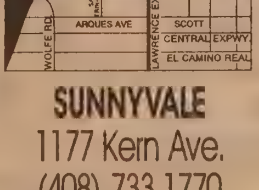

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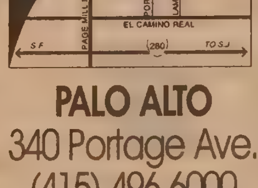

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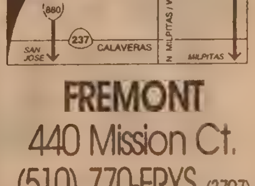

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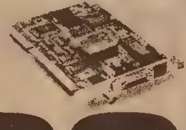

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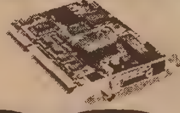

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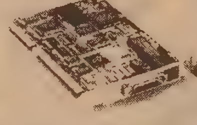

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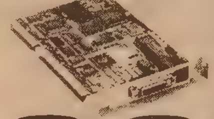

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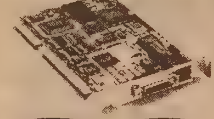

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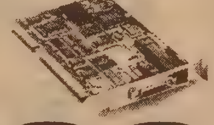

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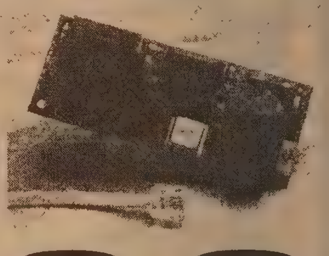

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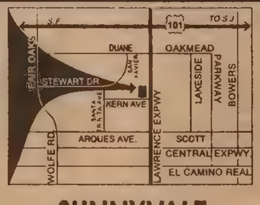

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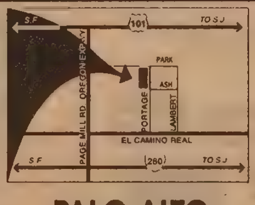

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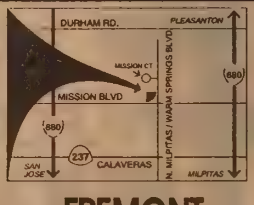

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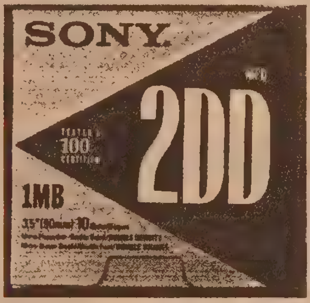

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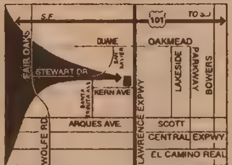

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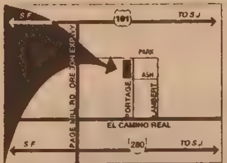

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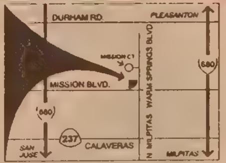

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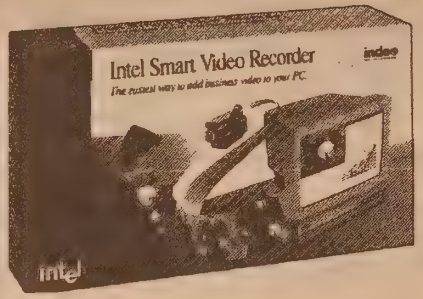
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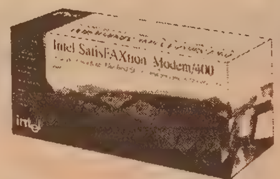

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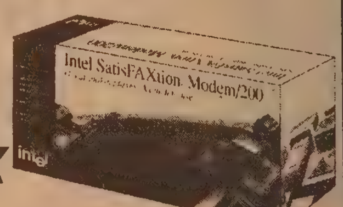

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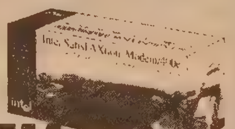

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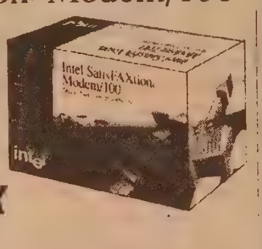

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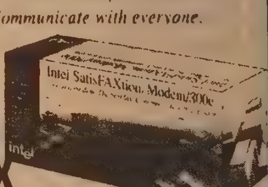

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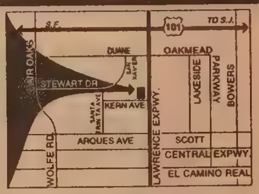

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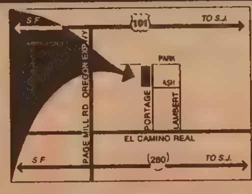

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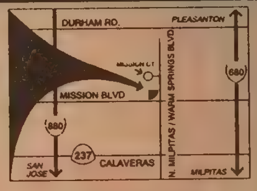

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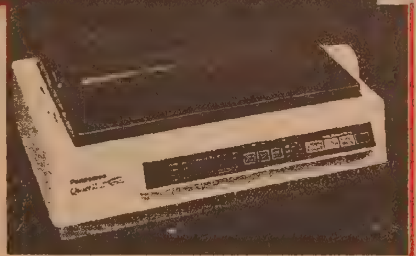

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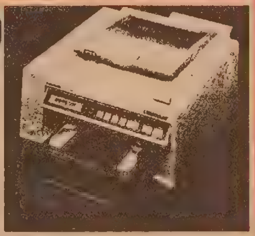

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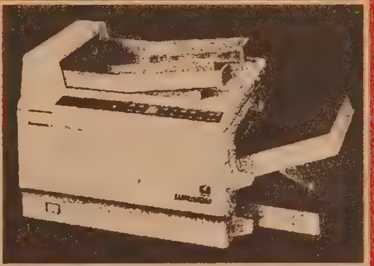

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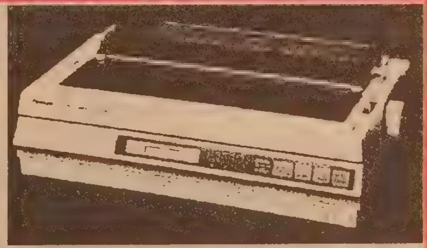

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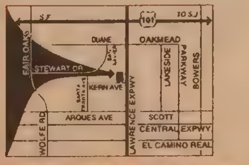

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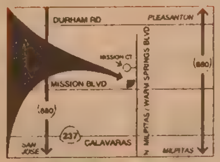

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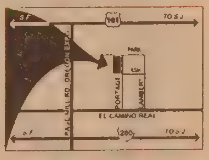

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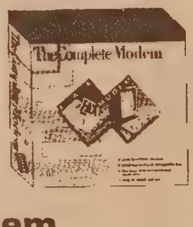

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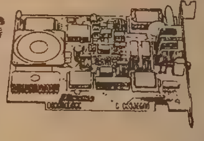

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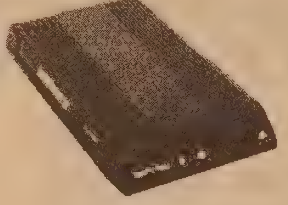

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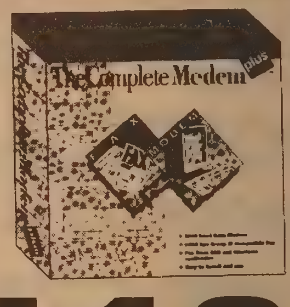

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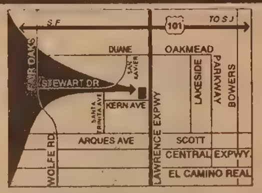

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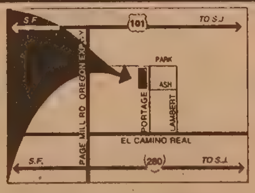

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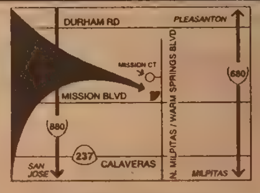

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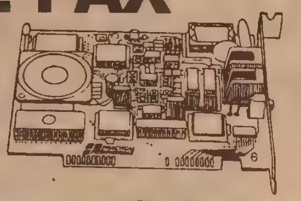

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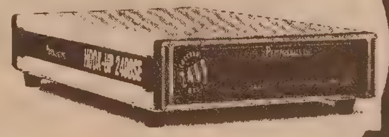

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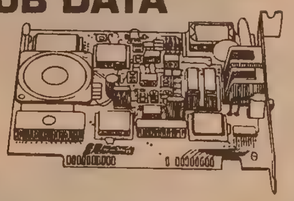

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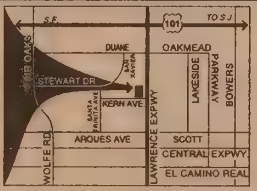

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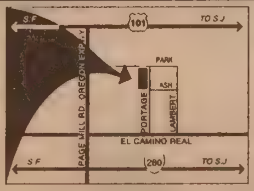

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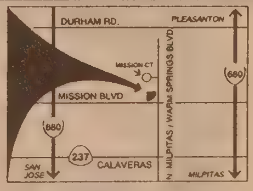

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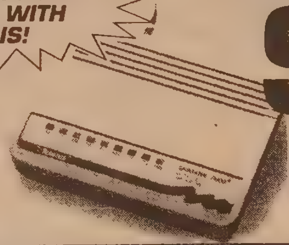

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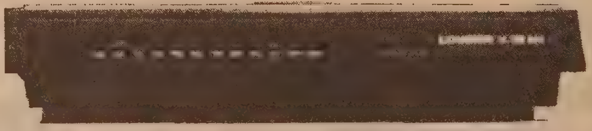

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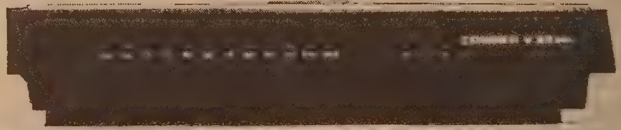

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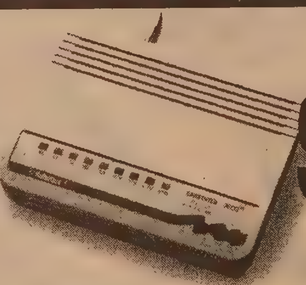

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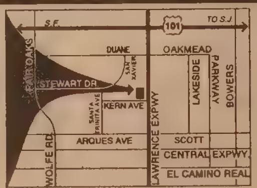

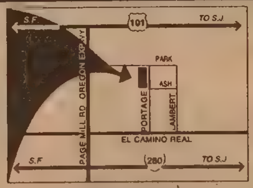

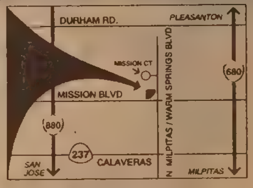

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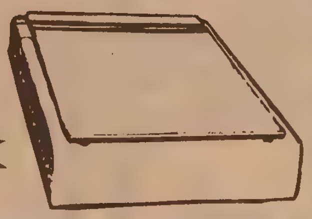

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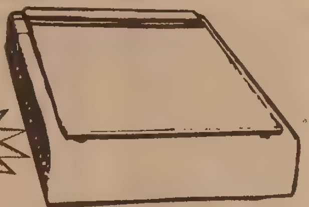

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17msec access time. Easy to install. Plugs into the printer port of any notebook, laptop or desktop computer. High performance SCSI technology provides maximum throughput. Daisy-chain connectors let you add up to seven different HomePort units to the same computer. Printer pass-through port allows simultaneous printing. Includes cables, software and accessories. Units are stackable with interlocking feet.
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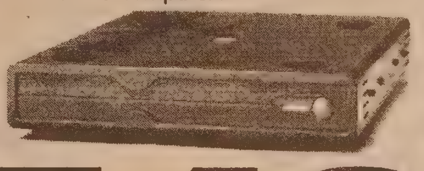

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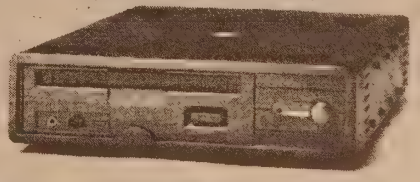

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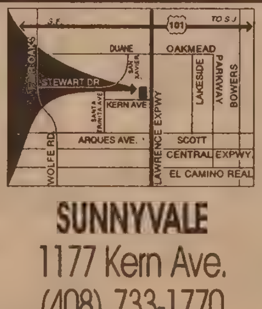

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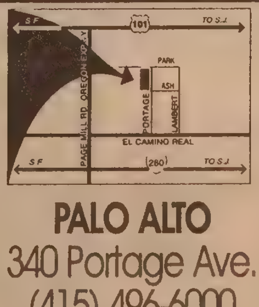

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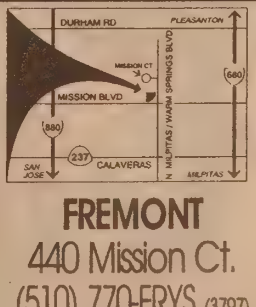

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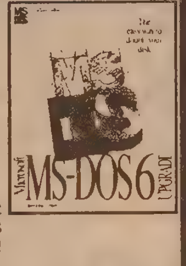

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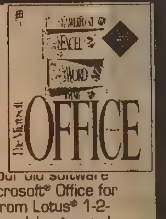

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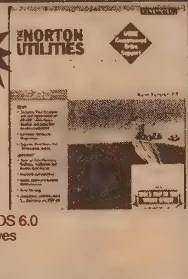

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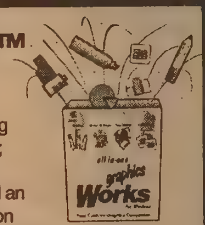

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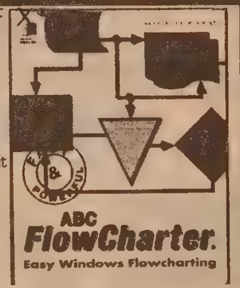

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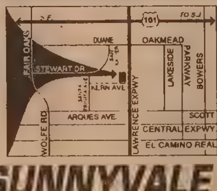

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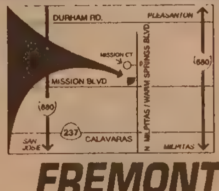

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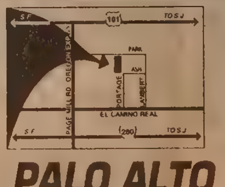

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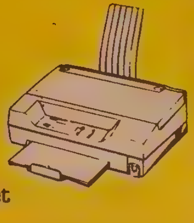

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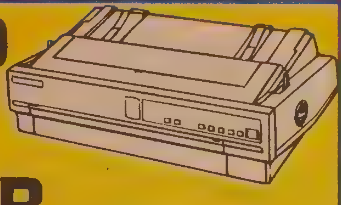

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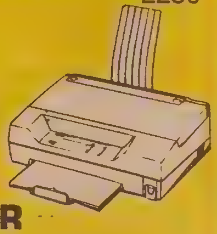

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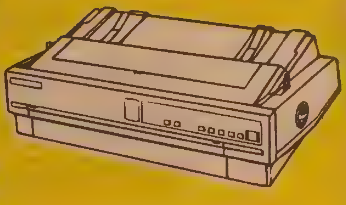

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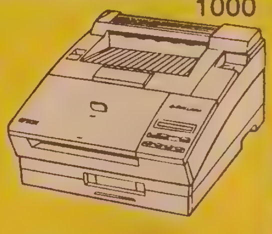

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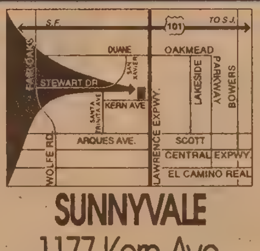

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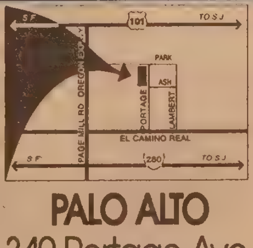

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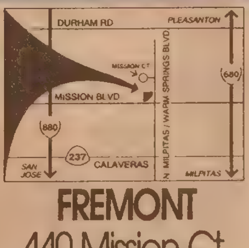

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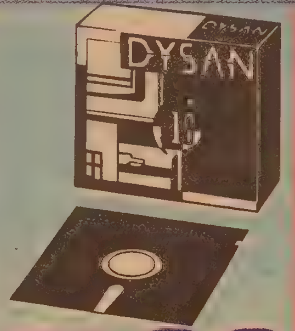

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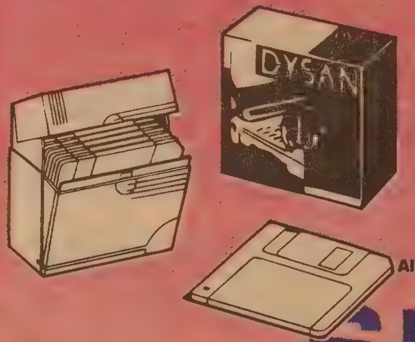

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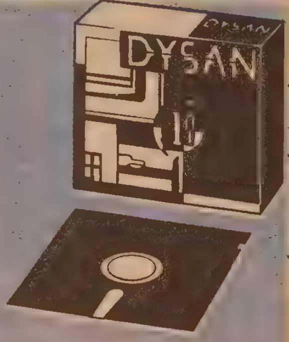

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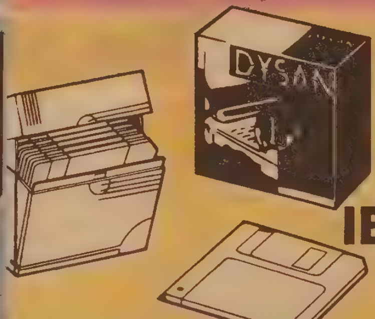

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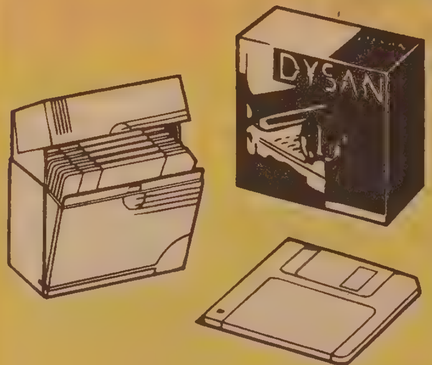

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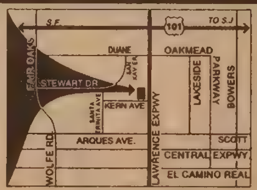

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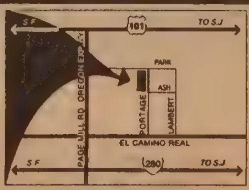

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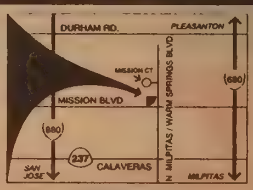

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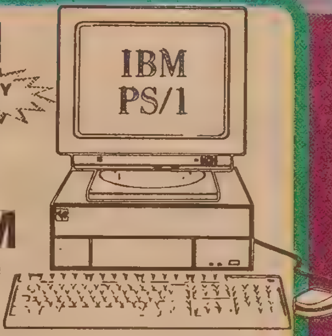

486SX-25MHz

170MB SVGA SYSTEM

Intel 80486SX-25MHz CPU • 170MB Hard Drive
4MB RAM Expandable to 32MB
3.5" 1.44MB Floppy Drive • 5 AT Slots
3 Drive Bays • IBM 14" .28 SVGA Color Monitor
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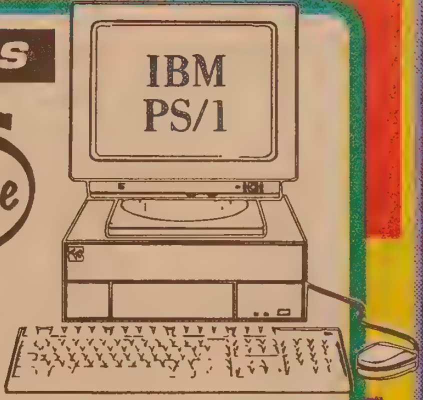

486DX-33MHz

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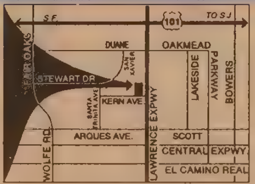

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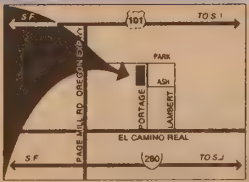

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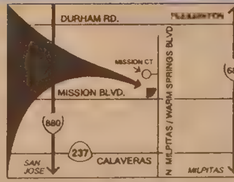

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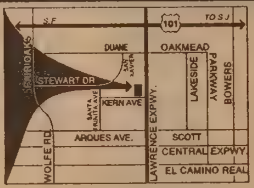

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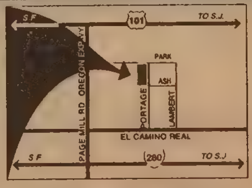

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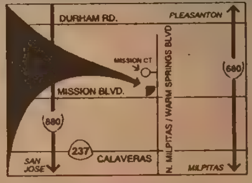

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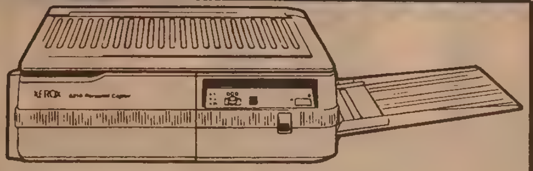

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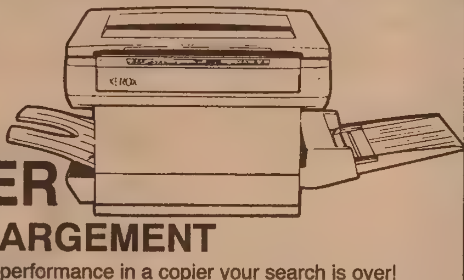

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If you're looking for versatility and premium performance in a copier your search is over! Xerox has designed a copier that incorporates reduction/enlargement technology enabling you to reduce a copy 75% and 95%, and enlarge to 124%, a 250 sheet paper tray which adjusts to hold memo to letter to legal size paper, an alternate 40 sheet paper tray which will enable you to copy on to letterhead, transparencies, card stock, labels, or colored paper without changing the main paper tray, built-in automatic exposure which scans documents for degrees of lightness or darkness to determine the appropriate exposure setting, multi-copy capability of 1 to 50 copies, letter and legal size copying, and manual bypass, all backed by the experts at team Xerox. Now just...

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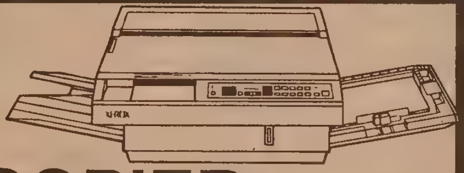

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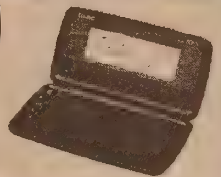
CASIO B.O.S.S. w/64KB MEMORY



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In today's world, It's sometimes hard to keep track of where you've been, who've seen, and where your going, but now it's easy as saying "C.A.S.I.O."! With this executive B.O.S.S. you will recieve 64K of memory, a raised QWERTY keyboard, schedule function, two-month calander display, clock with world time capability, business card library, telephone directory, memo function, daily alarm, schedule alarm, and much more. For Mac and PC users, Casio's optional Interlink cables will enable you to transfer data files to your computer.

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CASIO B.O.S.S. 64K WIDE SCREEN BUSINESS ORGANIZER

This unbelievable value comes equipped with 64KB of memory (W/additional memory available), a telephone directory, business card library, calendar, schedule planner, schedule alarm, clock w/world time capability, all displayed on a 6 line by 32 character screen! The best value you will find this at only...

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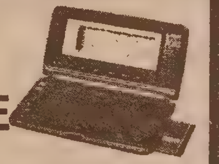
CASIO 256K EXECUTIVE B.O.S.S.



w/BUILT-IN SPREADSHEET

Casio's latest business organizer comes equipped with a business card management function, schedule function, two month calendar display, world time, a daily alarm, schedule alarm, telephone directory, memo functions, reminder function, to do list, cut & paste function, and spreadsheet function (compatible with Lotus 1-2-3 data) all displayed on a wide 40 character by 10 line screen. An Invaluable investment at only...

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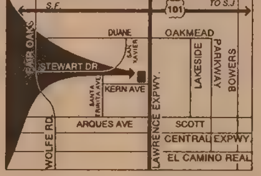

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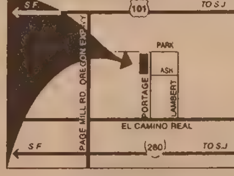

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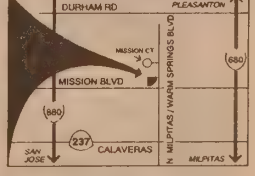

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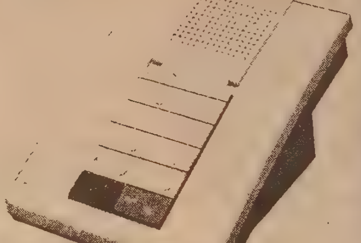

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w/26 MINUTE CAPACITY

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w/4 VOICE MAILBOXES • 26 MINUTE TOTAL CAPACITY

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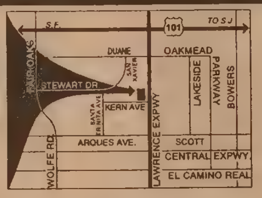

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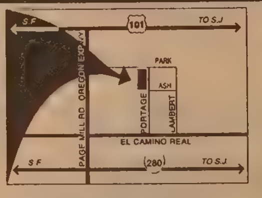

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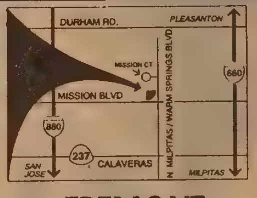

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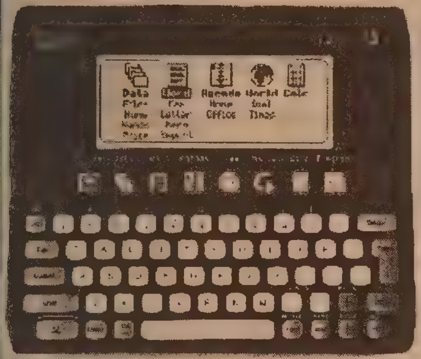
PSION SERIES 3



POCKET-SIZED 256KB COMPUTER WITH BUILT-IN SPREADSHEETS

Psion has redefined the state of the art in hand held computers with the new Series 3. It may be small, but this pocket-sized programmable computer comes equipped with features found in desktop machines plus powerful built-in software, including a full specification word processor and outliner that's compatible with Microsoft word. When using the Series 3 you will quickly learn from the system of graphic displays and option list how easy the Series 3 is to use. And with Psion's unique Multitasking Operating System, as many of the facilities as you want can be used at the same time! Other features include an automatic phone dialer, world information, a time and personal management file, powerful graphics programming language (OPL/w) which will enable you to write your own applications and two expansion ports for plug in SSD devices for unlimited memory and software.

MODEL
SERIES 3
#1763861

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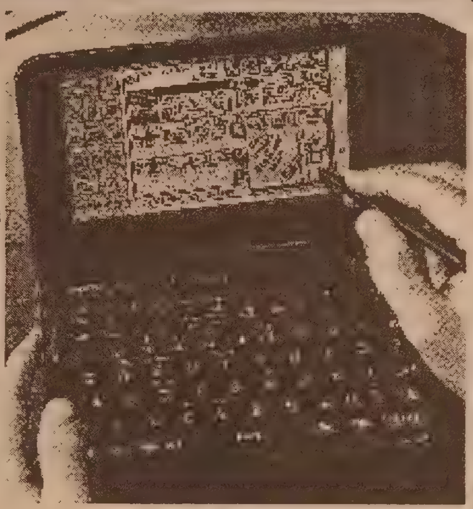
256K PERSONAL ORGANIZER WITH TOUCH SCREEN TECHNOLOGY



This Sharp Wizard lets you leave your portable computer at home but puts the power of thatcomputer in your pocket! Here's a small sampling of the innovative features. Touch screen technology which allows you to write or draw on the screen using the Wizard pen, filer which organizes related data into folders that can be transferred to another touch screen Wizard Via infared, and it's true word processer with a large screen display and a keyboard that's 75% the size of a standard PC keyboard. The possibilities are endless at only...

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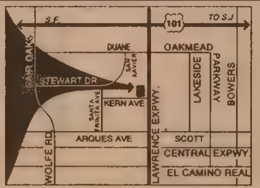

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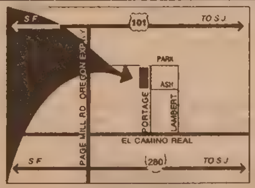

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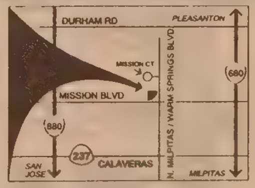

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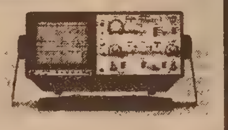

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V-6023
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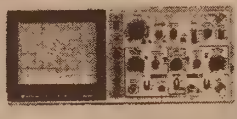

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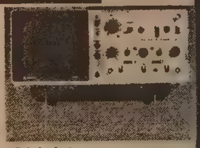

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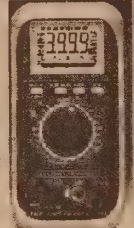

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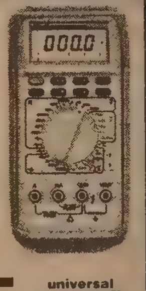

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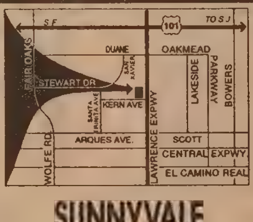

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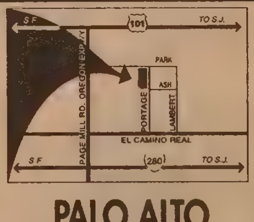

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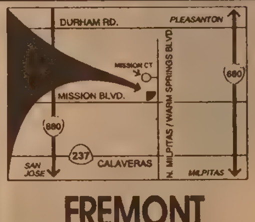

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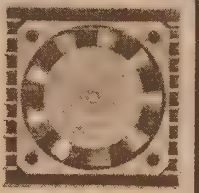

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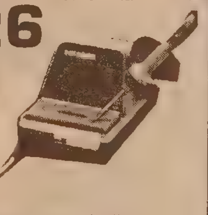

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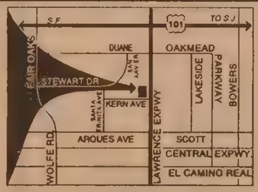

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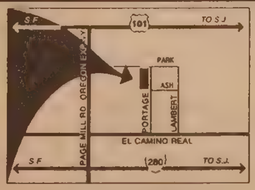

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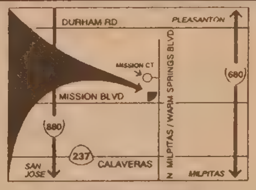

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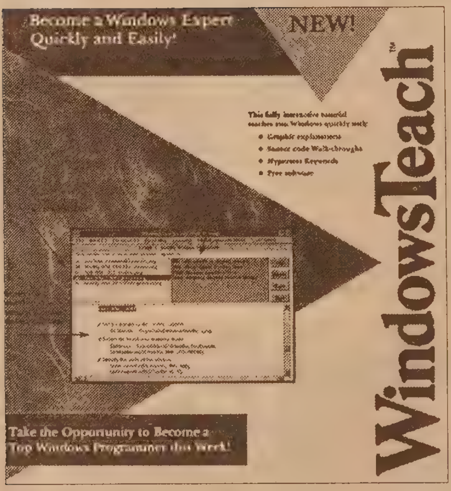
WindowsTeach is an interactive application that teaches you Windows programming quickly and easily with graphic tutorials, hypertext, and "stepwise source cond annotations and explanations." The program has three components: the Concepts Track, the Program Track, and the Hints and Suggestions section. The Concepts Track graphically explains the structure of Windows, and the Program Track has twenty-one clearly structured programs which illustrate key features of Windows. The Hints and Suggestions section provides a list of "do/don't" items that save the user invaluable programming time. ($123) IntelligenceWare, Inc., 5933 W. Century Blvd., Los Angeles, CA 90045.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PRODUCT UPDATES

➤ **Above Software** released **Golden Retriever 2.0b**, a DOS and Windows document manager that helps users to create, store, track, and search for documents and data files. Above Software, Inc., 2698 White Rd., #200, Irvine, CA 92714. 1-800-344-0116.

➤ **Aladdin Systems** released **UnStuff/PC 1.1**, its freeware program which allows users to expand Macintosh StuffIt archives on PC compatibles. The update incorporates a Windows Program Information File (.PIF) improving UnStuff/PC's interface and performance under Windows 3.1. Aladdin Systems, Inc., 165 Westridge Dr., Watsonville, CA 95076. (408)761-6200.

➤ **Autodesk Inc.'s Multimedia Division** announced a competitive trade-up campaign for **3D Studio**. The program will provide a 50% discount off the purchase price of 3D Studio software. Autodesk, Inc., 1-800-879-4233.

➤ **CE Software** released **QuickMail 2.6**, its cross-platform email software package. CE Software, Inc., 1801 Industrial Circle, PO Box 65580, W. Des Moines, IA 50265. (515)224-1995.

➤ **Claris** announced that, from now through August 15, 1993, **FileMaker Pro 2.0 for Windows** will be offered for $129, usually available at a suggested retail price of $399. Claris Corp., 5201 Patrick Henry Dr., Box 58168, Santa Clara, CA 95052. (408)727-8227.

➤ **Connectix** released **CPU 2.0**, a major upgrade to its PowerBook Utilities software package. Registered users of CPU 1.0 or other major PowerBook utility collections can upgrade to CPU 2.0 for $19. Connectix Corp., 1-800-950-5880 or (415)571-5100.

➤ **Hewlett-Packard** reduced the prices of its PC- and MicroChannel-compatible **color and grayscale scanners.** In addition, users who purchase the **Macintosh-compatible HP ScanJet IIc scanner** now through September 30, 1993, will receive a free copy of **Adobe Photoshop Limited Edition** image-editing software. Hewlett-Packard Co., Direct Marketing Organization, PO Box 58059, MS511L-SJ, Santa Clara, CA 95051-8059.

➤ **Kensington** introduced an enhanced version of its **NoteBook KeyPad**, an external numeric keypad for the Macintosh PowerBook. Kensington Corp., 2855 Campus Dr., San Mateo, CA 94403. 1-800-535-4242.

➤ **Mathematica** will include **Prosonus's MusicBytes** music and sound effects library with its **TEMPRA Access** and **TEMPRA Vision** multimedia products. Mathematica, Inc., 402 S. Kentucky Ave., Lakeland, FL 33801. (813)682-1128.

➤ **SunPics** released **NeWSprint 2.5**, an advanced printing solution that is compatible with Sun Solaris 2 operating environment and UNIX SVR4. Sun Microsystem, Inc., 2550 Garcia Ave., Mountain View, CA 94043-1100. (415)960-1300.

➤ **WEBCORP** launched an end-user upgrade program for **WEB 4.0 for Windows and DOS**, the latest version of its peer-to-peer network operating system. The program offers registered owners of LANtastic, Novell Lite, or previous versions of WEB an upgrade at a 70% discount off WEB's suggested retail price. This upgrade offer expires June 30, 1993. WEBCORP, 2750 Bridgeway, Sausalito, CA 94965. (415)331-1449.

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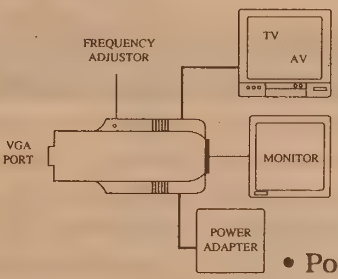

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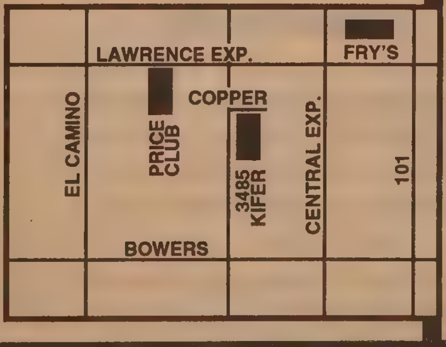

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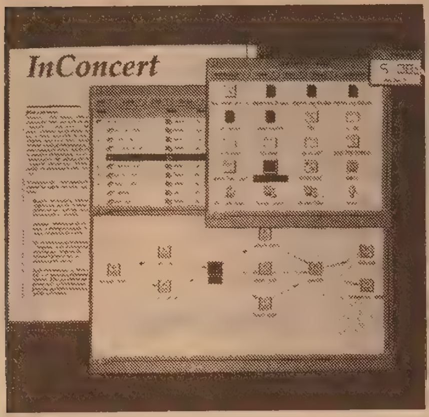

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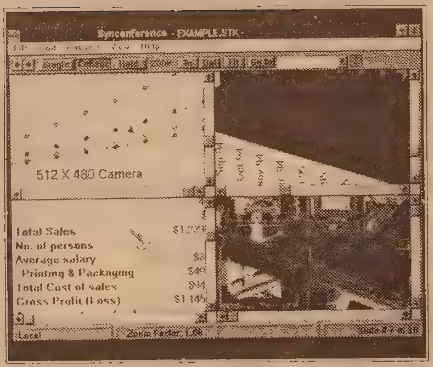
Synconference is a PC teleconferencing software package for presenting and discussing soft copy documents on two remotely linked computers. Running under Windows 3.1 using a standard modem (1200 bps or higher) and a regular telephone line, Synconference is intended for such applications as business presentations, technical training, and education. During a remote presentation, Synconference acts like two synchronized slide projectors with the presenter's commands, pointing, and free-hand drawings being continuously replicated on the listener side. In addition to synchronized presentation, it supports slide stack file transfer, and a feature that easily exchanges the role of the presenter and the listener at any time. ($395) Modus Software, Inc., PO Box 1935 Los Altos, CA 94022. (415)964-1936.



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Compel 1.0 lets users easily create interactive business presentations with multimedia data, including video, animation, and sound. Compel offers robust tools for creating and delivering dynamic on-screen presentations as well as traditional presentations with slides, overheads, or hard copy. Benefits and features include ease of use, extensive multimedia support, presentation portability, full OLE client support, extensive transition effects, and more than one hundred templates. ($295) Asymetrix Corp., 110 110th Ave. N.E., Suite 700, Bellevue, WA 98004. (206)462-0501.

DAZZLE ENVELOPE MANAGER

A Windows utility, DAZzle quickly produces custom envelopes that feature company logos (or any other graphics), personalized return addresses, and text in any Windows font. Multiple envelope or label designs can be saved for future use. Using a unique telecommunications technology, DAZzle can check any address against the US Postal Service's directory of all US addresses, correcting most common errors and adding the nine-digit ZIP code and bar code. The Dial-A-ZIP process takes about twenty seconds and can run in the background. There is no charge for this service. ($39.95) Envelope Manager Software, 247 High St., Palo Alto, CA 94301-1041. 1-800-576-3279.

PC HARDWARE

PCVISION

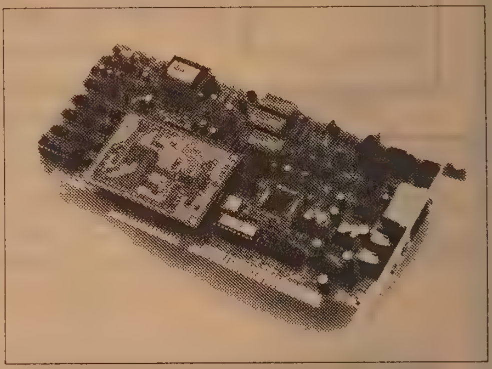
PCVision, a new expansion board from Calypso, lets you convert an ordinary PC into a powerful multimedia computer. With a built-in SVGA circuit, PCVision provides a movable, sizeable "Window in a Window," while displaying full-motion video and television on a PC. With 16-bit digital sound audio circuitry and an on-board audio amplifier, it enhances the sound for television, video, music, and games. Packaged with PCVision is PC Audio software, which provides a variety of audio clips and reminders. TeleTex Decoder circuit, which tracks stocks and information is also included. ($495) Calypso Micro Products, 160-A Albright Way, Los Gatos, CA 95030. (408)379-9494.

TELEDISK FAXPAK

FaxPak offers laser printer owners a low-cost, plain paper fax solution. This new fax receiver lets you print faxes on HP and compatible laser printers. Installation is quick—simply connect FaxPak to a phone line and a printer port. A personal computer or network can also be easily connected. FaxPak automatically switches between printing incoming faxes and computer output. In addition, FaxPak does not require a dedicated fax phone line because it automatically distinguishes between voice and fax calls. The printer can even be turned off or off-line. FaxPak has its own power supply and 768K of internal memory to receive and store up to forty pages of information. ($299) Teledisk Systems, Inc., 2401 Marinship Way, Suite 200, Sausalito, CA 94965. 1-800-669-3700.

SIIG TELECOMMUNICATOR

The TeleCommunicator, a ten-in-one background operating telecommunications manager, features a voice mail system, fax system, and a modem in one add-on board. It recognizes and automatically switches between fax/modem and voice communications. Potential applications for the TeleCommunicator include a pre-recorded customer service information center where customers can not only listen to voice instructions to get their questions answered, but also receive documentation via fax by using the Fax-on Demand function. Businesses can give customers 24-hour access to brochures, documentation and other information. ($299) SIIG, Inc., 6078 Stewart Ave., Fremont, CA 94538-3152. (510)657-8688.



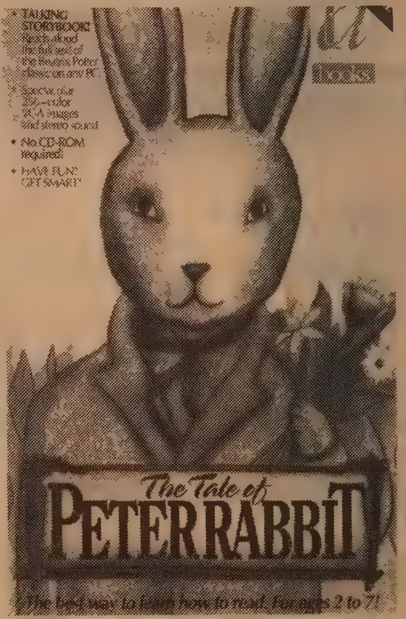
REVIEWS

GAME REVIEWS

By Mike Markowitz

THE TALE OF PETER RABBIT

Designed By: Bill Gross
Published By: Knowledge Adventure
For: MS-DOS (640K, VGA graphics, 1.44MB 3.5" floppy disk drive, mouse and popular audio cards supported)
List Price: $24.95



As far back as Aesop's fable of the Tortoise and the Hare, a common theme in Western literature has been the use of rodent garden pests to provide moral lessons for the young.

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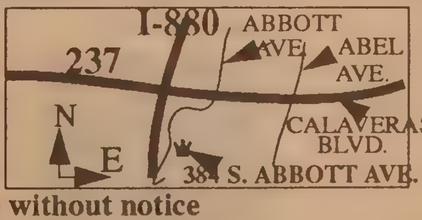

* Prices, availability and terms are subject to change without notice
* Not responsible for typos

Nobody did this better than the late Victorian writer and marketing genius Beatrix Potter. *The Tale of Peter Rabbit*, published in 1902, has sold over nine million copies.

Knowledge Adventure has now packaged the full text of this classic as an "interactive book" with professional narration and charming new 256-color graphics by children's book illustrator, Lonni Sue Johnson.

Graphics and Animation: 9
Sound: 9
User Interface: 9
Overall Value: 9

Since my youth was misspent in the company of history books and plastic model kits, I had never encountered *The Tale of Peter Rabbit* before I received this program to review. In twenty-six pages, Peter sneaks into Mr. MacGregor's garden, eats too many fresh vegetables, evades several clumsy attempts to capture him, and returns home to a structured but nurturing single-parent family. I suspect that American suburban kids, unfamiliar with English domestic gardening practices, and accustomed to the rather more action-packed adventures of Mutant Ninja Turtles, may find the whole thing rather tame, or misinterpret it as a cautionary tale about juvenile bulimia.

Since this is an interactive book, you can click on objects in the drawing to hear and see their names. If your computer has an audio card, you can listen to a musical sound track as well as the voice-over narration.

The Tale of Peter Rabbit is very reasonably priced, and modestly packaged in a simple cardboard folder. An 18-page user guide provides clear instructions, and suggestions for using the program with children as young as two years. If you mail in the registration card, Knowledge Adventure promises to send you a kit of seeds, to grow your own carrots, radishes, and lettuce to lure reckless bunnies into your garden.

The program is installed from two high-density 3.5" disks and takes up about 3MB of hard disk space. (Knowledge Adventure, Inc., 4502 Dyer St., La Crescenta, CA 91214. 1-800-542-4240)

MYSTERY AT THE MUSEUMS

Designed By: Rick Banks and Paul Butler
Published By: Binary Zoo
For: ms-dos (386 or higher CPU, VGA/SVGA/MCGA graphics, mouse required, Sound Blaster or compatible audio card recommended)

Graphics and Animation: 9
Sound: 8
User Interface: 8
Overall Value: 8

List Price: $59.95

Binary Zoo is a new affiliated label of Brøderbund, with a commitment to creating challenging, engaging, and stylish software for kids. All the key people at Binary Zoo are parents of young children. Mystery at the Museums is the first educational game to be licensed and approved by the formidable Smithsonian Institution in Washington, DC. The target audience is ages 7–14, but the quality of the graphics and the diversity of the puzzles will appeal to gamers over a wide range of ages and interests.

The premise of the game is that some of the museum's treasures have been misplaced and your cartoon character, Edison, has to find them before the museum opens. You can customize the hair, skin, and clothing colors of this cute animated figure. You have a map of the museum complex to guide you. In each building you visit, you have to solve a different puzzle. At the beginning of a game you choose a difficulty level—the higher the level the more puzzles you need to solve to complete the task. These include memory and logic games, pattern recognition, and 3-D visualization exercises; sixteen different activities in all. The on-screen controls are easy to use, and there is a Help button on every screen.

MYSTERY AT THE MUSEUMS IS THE FIRST EDUCATIONAL GAME TO BE LICENSED AND APPROVED BY THE FORMIDABLE SMITHSONIAN INSTITUTION.

The only criticism I would offer is that Mystery at the Museums provides very little background information about the historic artifacts you are hunting.

The game is installed from compressed files on three high-density 3.5" disks and takes up about 4MB of hard disk space after installation. There is a clearly written manual and a useful *Troubleshooting Guide.* (Binary Zoo, PO Box 3210, Champlain, NY 12919-3210. 1-800-521-6263)

V FOR VICTORY: VELIKIYE LUKI

Designed By: Ed Rains, Eric Young, Keith Zabalaoui, and Larry Merkel
Published By: Three-Sixty Pacific
For: MS-DOS (640K, requires Super VGA), Macintosh (2MB for monochrome, 3MB for color)
List Price: $69.95

In Russian, Velikiye Luki means "Big Bends." The little town of Velikiye Luki lies 250 miles West of Moscow, in a big bend of the marshy Lovat River. In the Winter of 1942, while the famous Battle of Stalingrad raged far to the south, the German and Russian armies fought a series of desperate and obscure battles for control of this strategic railroad junction.

V for Victory: Velikiye Luki is a wargamer's wargame: meticulously documented, carefully researched, and designed with a deep understanding of WWII combat operations on the Russian Front. Terrain is modeled as a grid of one-kilometer hexagons, and each turn represents four hours of real time. Individual units are battalions and companies. Effects of supply, weather, and command control are modeled in great detail. The rich graphic user interface hides much of the complexity until you need it.

You can play either side against the computer or a human opponent. There is no option for playing with two computers over a network or modem, but it would be possible to play against a remote opponent by exchanging saved games on disk each turn.

One of the great advantages of implementing a tabletop war game on the computer is the ability to limit the player's knowledge of the situation. When you select the Limited Intelligence option, the screen only displays enemy units that your forces can see. Another optional "Fog of War" feature limits the accuracyof information you get about your own units as they suffer increasing damage in combat.

Graphics and Animation: 9
Sound: 8
User Interface: 8
Overall Value: 8

The Mac version is installed from self-extracting compressed archive files on two high-density disks. There are separate color and monochrome files, and even separate applications, depending on whether or not you have a math coprocessor chip (FPU) in your computer. The program unpacks everything, but you can delete the files your system doesn't need. The monochrome version ran without problems under System 7 on a PowerBook 100, and the 256-color version was tested successfully on a Mac LC with 4 MB of RAM and the low-budget Apple 12" color monitor.

There are eight scenarios, covering various parts of the battle, ranging from Beginner to Advanced in difficulty and length.

Continued on page 208

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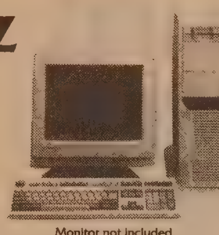
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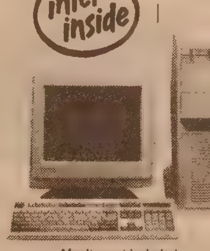
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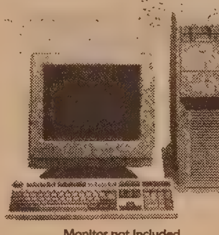
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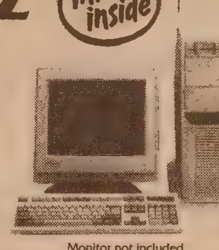
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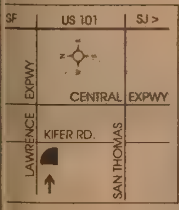

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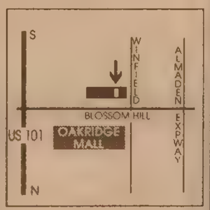

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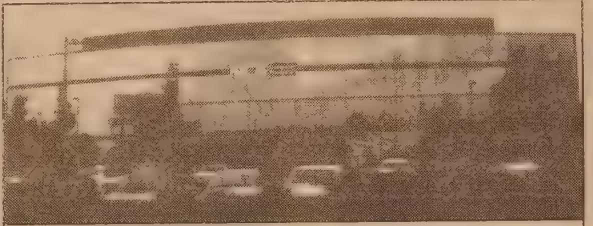

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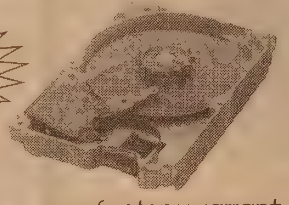

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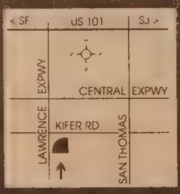

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250MB	WD2250	64K	14ms	3.5X1"	$299
340MB	WD2340	64K	12ms	3.5X1"	$415

HEWLETT PACKARD

Brand new with 5-year factory warranty

FEATURING

C2247 1.2Gb 3.5" SCSI-II
C97556; C97558 1.2GB;
C3009 1.8GB; & C3010 2.3GB

DRIVE KITS & SUBSYSTEMS
AVAILABLE AT NCA PERIPHERALS

INTRODUCING

DEC

5-YEAR WARRANTY

High End, High Capacity

***Fast* SCSI-II**

Formatted CAPACITY	M/N	SIZE	RPM	SPEED	INT.	EXT.
852MB	3085A	3.5"	5400	9.5ms	$1199	$1299
1.0GB	3105S	3.5"	5400	9.5ms	$1299	$1429
1.6GB	3160S	3.5"	5400	9.5ms	$1699	$1829
2.0GB	5200S	FH	3600	12.5ms	$1899	$2099
3.5GB	5350S	FH	5400	11.5ms	$3599	$3799

SAMSUNG

Electronics

High Performance & Quality,
2 Year Warranty

120MB
IDE, 3.5X1"
Low profile

$189

250MB
IDE, 3.5X1"

$295

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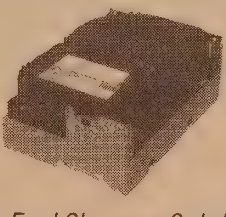


High-End Storage Solutions

SCSI-II / ESDI*

CAPACITY	M/N	RPM	SIZE	TYPE	INT.	EXT.
1.1GB	DK315C-11	5400	3.5"	*FAST* SCSI-2	$1699	$1899
1.4GB	DK315C-14	5400	3.5"	*FAST* SCSI-2	$2099	$2299
1.5GB	DK516-15*	3600	FH	ESDI	$2199	N/A
1.6GB	DK516C-16	3600	FH	SCSI-2	$2199	$2399
3.7GB	DK517-37	5400	FH	*FAST* SCSI-2	$3999	$4199

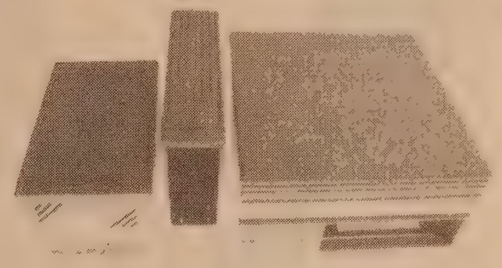
3.5" SCSI-2 MASSIVE STORAGE

CAPACITY	MAKE	MODEL	MTBF	CACHE	SPEED	INTERNAL	EXTERNAL
877MB	TOSHIBA	M438	200K	512K	12MS	$939	$1059
1.0GB	FUJITSU	M2694	300K	256K	10MS	$1569	$1679
1.0GB	SEAGATE	ST11200	200K	256K	10MS	$1139	$1239
1.0GB	HP	C2247	300K	256K	10MS	$1399	$1499
1.0GB	MICROPOLIS	2112	300K	256K	10MS	$1449	$1549
1.0GB	DEC	3105S	NA	256K	9.5MS	$1299	$1429
1.2GB	QUANTUM	PD1225	350K	512K	10MS	$1469	$1579
1.2GB	TOSHIBA	MK538	200K	512K	12MS	$1199	$1339
1.2GB	MAXTOR	MXT1240S	300K	256K	8.5MS	$1449	$1559
1.6GB	DEC	3160S	NA	512K	9.5MS	$1699	$1829

NCA's High Quality

EXTERNAL DRIVES

For MAC, SUN, NeXT, and IBM Compatibles
Complete with Cables, and formatting Software for Mac



EXTERNAL HARD DISK DRIVES
42MB TO 3.6GB
EXTERNAL TAPE BACK-UP DRIVES
250MB TO 8GB
EXTERNAL REMOVABLE DRIVES
44MB / 88MB /
90MB / 150MB
EXTERNAL CD ROM DRIVES
EXTERNAL. OPTICAL DRIVES

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OPTIONAL SERVICE

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If your covered peripheral should fail within the period, NCA will replace or repair the unit within 8 working hours.*

EXTENDED W

OPTIONAL SERVICE

When one year is just not good enough.
Extend your warranty with
NCA's EXTENDED WARRANTY OPTIONAL PLAN

FULL SERVICE CENTER

- Complete installation center for PC and MAC
- Same Day Service
- Mac Hard Drive and Memory installation center

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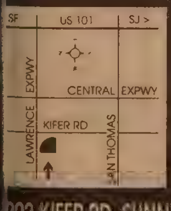

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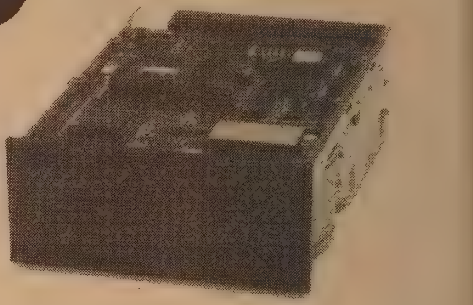
Novell Labs Tested & Approved

FUJITSU®

5-YEAR WARRANTY



520MB 3.5"

- ▶3.5" HH Drive
- ▶11ms Seek Time
- ▶240K Read/Write Cache(SCSI)
- ▶5-Year Warranty

IDE $789
M2624T

SCSI $789
M2624FA

SCSI

	MODEL	CACHE	SPEED	SIZE	INTERNAL	EXTERNAL
425MB	***M2623SA***	***240K***	***11ms***	***3.5"***	***$699***	***$799***
520MB	M2624FA	240K	11ms	3.5"	$789	$899
1.2GB	M2694SA	256K	10ms	3.5"	$1569	$1679
1.2GB	M2266SA	256K	14ms	FH	$1129	$1299
2.0GB	M2652SA	256K	11ms	FH	$2099	$2299
2.4GB	M2654SA	256K	12ms	FH	$2449	$2649

IDE

	MODEL	CACHE	SPEED		INTERNAL
330MB	M2622T	64K	12ms	3.5"	$599
425MB	M2623T	64K	12ms	3.5"	$769
520MB	M2624T	64K	12ms	3.5"	$789

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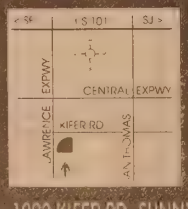

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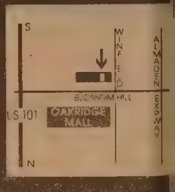

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Maxtor®

Novell Labs Tested & Approved

345MB IDE

- ▶ Model 7345A
- ▶ 3.5"X1"
- ▶ 15ms access seek time

$459

IDE

	MODEL	CACHE	SPEED		INTERNAL
128MB	for Notebooks 25128A	32K	15ms	2.5"	$299
130MB	7120A	64K	15ms	3.5X1"	$189
213MB	7213A	64K	15ms	3.5X1"	$269
245MB	7245A	64K	15ms	3.5"	$298
340MB	7345A	64K	15ms	3.5"	$459
535MB	LXT-535A	64K	12ms	3.5"	$879

EXTERNAL SUBSYSTEMS

For MAC, SUN
IBM Comp.

High Quality Metal Case, Complete with Cables, and formatting Software for MAC

7120S	120MBSubSystem	$349
7213S	213MBSubSystem	$449
LXT340S	340MB SubSystem	$679
LXT535S	535MBSubSystem	$999
MXT-540	540MBSubSytem	$1129
MXT-1240	1.2GBSubSystem	$1559
PO-12S	1.2GBSubSystem	$1379
P1-17S	1.7GB SubSystem	$1599

SCSI

	MODEL	CACHE	SPEED	SIZE	INTERNAL	EXTERNAL
120MB	7120S	64K	15ms	3.5X1"	$239	$349
213MB	7213S	64K	15ms	3.5X1"	$339	$449
340MB	LXT-340S	64K	15ms	3.5"	$569	$679
535MB	LXT-535S	64K	12ms	3.5"	$899	$999
540MB	***MXT-540***	***256K***	***8.5ms***	***3.5X1"***	***$999***	***$1129***
1.2GB	***MXT-1240***	***512K***	***8.5ms***	***3.5"***	***$1449***	***$1559***
1.2GB	PO-12S	256K	13ms	FH	$1099	$1379
1.7GB	P1-17S	256K	13ms	FH	$1399	$1599

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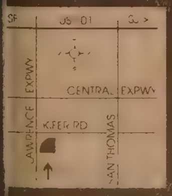

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SCSI DISK CONTROLLERS

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SCSI CONTROLLERS

MODEL	DESCRIPTION	PRICE
1522K	16-BIT 7HD/2FD KIT	$159
1542C	BUS MASTER COMPLETE KIT	$259
1542C+	BUS MASTER KIT WITH COREL SCSI	$329
1640	MICROCHANNEL FOR PS/2, 7HD	$329
1742	EISA KIT, 32 BIT, 7HD/2FD	$429

aaa always technology

SCSI CONTROLLERS

MODEL	DESCRIPTION	PRICE
IN2000	16 BIT 7HD/2FD "Easest to use"	$179
AL1000	SCSI *TO* PARALLEL W/BACKUP SOFTWARE	$169

FUTURE® DOMAIN

SCSI CONTROLLERS

MODEL	DESCRIPTION	PRICE
MC600	*FOR* PS/2, CARD	$179
TMC850	8 BIT CARD W/BIOS	$59
TMC850	8 BIT W/O BIOS	$39
TMC1670	KIT 2HD/2FD	$159
TMC1680	16 BIT CARD	$169
TMC1680	16 BIT, 7HD/4FD KIT	$249
TMC7000	32 BIT, EISA KIT	$299

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Caching Controllers

<0.3 ms, *Fast, Uses Standard 256K, 1X9, 4X9 Simm Modules*

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Intelligent

SCSI CONTROLLERS

16-BIT, 7HD/2FD SCSI CARD	**$119**

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FULL KITS W/DRIVERS FOR CD-ROM/OPTICAL... ETC.

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MODEL	DESCRIPTION	PRICE
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T130	8 BIT, HIGH PERF., 7HD with SCSI works	$79
T160	16 BIT, HIGH PERF.	$CALL
T228	MICROCHANNEL, 7HD	$159
T260	16-BIT, MICROCHANNEL	$CALL
T338	PARALLEL PORT to SCSI ADAPTER	$119
T348	PARALLEL PORT to SCSI PLUS	$179
	SCSI Works W/TapeMate S/W for Tape Back-up	$59

UltraStor

SCSI CONTROLLERS

MODEL	DESCRIPTION	PRICE
14F	FD/HD (10MB/SEC) KIT	$229
24F	EISA, 64K, *Fast* (33MB/SEC)	$379
34F	VESA Local Bus Controller	$295

BUSLOGIC

SCSI CONTROLLERS FOR POWER USERS

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BT-542	BUS MASTER SCSI-2 CARD	$199
BT542-KI	BUS MASTER SCSI-2 KIT	$229
BT545S	BUS MASTER, FAST SCSI-2	$219
BT545KT	BUS MASTER, FAST SCSI-2 KIT	$239
BT742A-KT	EISA SCSI-2 KIT	$349
BT747A-KT	EISA FAST SCSI-2 KIT	$399

ETHERNET ADAPTERS

Kodiak TECHNOLOGY

#1 Source For Ethernet

- **Third Generation Technology**
- **Five-Year Warranty**
- **Toll-Free Technical Support**
- **CHKNET™ Diagnostics Software**

MADE IN THE USA

New KODIAK NotePort™ Connector

- Small Form Factor
- Pre-Built Software drivers
- Flexible cable to desk Unit
- Built-in power Supply
- Supports both Thin Coax and 10Base-T

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KODIAK - 16

16-Bit LAN Adapter Cards For Thick And Thin Coax or 10Base T **$99**

5-PACK $439

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STANDARD IDE

IDE CONTROLLERS

MODEL	DESCRIPTION	PRICE
200	2HD/2FD CONTROLLER W/CABLES	$15
211	2HD/2FD W/2SERIAL, 1PAR, 1GAME	$25
NCL53	SMART CONT. W/BIOS EASY INSTALL	$49
222	2HD/2FD/UP TO 2.88MB WITH I/O	$39
223	2HD/2FD for VESA LOCAL BUS I/O	$79
15C	CACHING (UP TO 8MB), 2HD, 2FD **UltraStor**	$199

PROMISE TECHNOLOGY INC.

Caching Controllers

.3ms *Fast* *Uses Standard SIMMS*

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DC-100	CACHING with I/O	$129
DC-200	CACHING (0MB, up to 16MB) 4HDs & 2FDs	$129
DC-2032	CACHING WITH I/O, 4HD/2FD/1 tape	$159
DC-4030	VESA LOCAL BUS (0MB up to 16MB) 4HDs/2FDs/1 tape	$189

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◆ Easy Set-up ◆ High Performance ◆ Plug & Play

MODEL	DESCRIPTION	PRICE
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21V	2HD (WITH BIOS), 4FD (UP TO 2.88M)	$69

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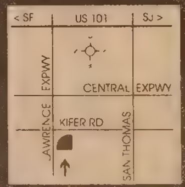

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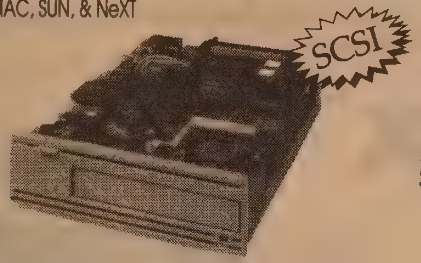
ARCHIVE

for IBM Compatibles, MAC, SUN, & NeXT



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- ◆ 250MB VIPER
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INT.	EXT.
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- ◆ 6MB/MIN.

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ANACONDA 2750
- ◆ 1.6GB
- ◆ 36MB/MIN
- ◆ SCSI-2

INT.	EXT.
$899	$999

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4324 TURBO PYTHON
- ◆ 4GB DAT 4mm
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4320NT
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IOMEGA

tape 250

RUNS OFF FLOPPY PORT
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- ▶ Reads QIC Tape and Irwin tapes
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- ▶ Windows Support

Tape 250 Insider

$189

EXTERNAL TAPE 250 PARALLEL PORT $429

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Single ....$29 3Pack $79

EXABYTE®

SUN compatible 8mm SCSI back up system

SCSI-8mm

CAPACITY	MODEL	SIZE	INT.	EXT.
2.2GB	EXB-8200	FH	$1619	$1949
2.2GB	EXB8205	HH	$1849	$2049
5.0GB	EXB-8500	FH	$2649	$2899
5.0GB	EXB-8505	HH	$2799	$2999

HEWLETT PACKARD

Setting the Standards

SCSI 4mm DAT

CAPACITY	MODEL	INT.	EXT.
2.0GB	35470 DAT	$1149	$1249
4-8GB	35480 DAT	$1299	$1399

WangDAT™

SCSI QIC-Format

CAPACITY	MODEL/TYPE	INT.	EXT.
250MB	5150 1/4" SCSI	$469	$569
525MB	5525 1/4" SCSI	$679	$779

SCSI 4mm DAT

CAPACITY	MODEL/TYPE	INT.	EXT.
2.0GB	3100 DAT	$1149	$1249
4-8GB	3200 DAT	$1249	$1399

TAPE CARTRIDGES

CAPACITY	MODEL/TYPE	SINGLE	5-PACK
20MB	QD 2120	$18.95	$90.00
50MB	QD 6250	$28.95	$120.00
25MB	QD-6525	$33.95	$155.00
.0GB	4mm DAT 90m	$19.95	$85.00
.0GB	8mm EXABYTE	$17.95	$79.95

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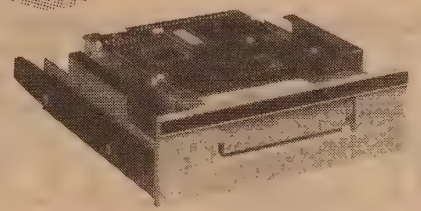
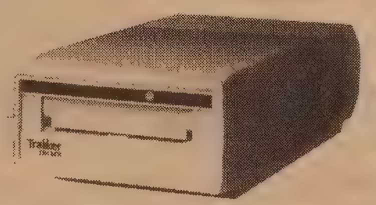


RUNS OFF FLOPPY PORT

CAPACITY	MODEL/TYPE	INT.
120MB	DJ10/IBM COMPATIBLE	$135
250MB	DJ20/IBM COMPATIBLE	$199

EXTERNAL KIT WITH CARD AND CABLES	$109
EXTERNAL TAPE PORT	$39
FC-10 TAPE CONTROLLER, WITH CABLES	$89
FC-15 HIGH PERFORMANCE 16-BIT CONTROLLER	$189

Trakker™



PARALLEL PRINTER PORT EXTERNAL TAPE BACK-UP SYSTEMS

RUNS OFF PARALLEL PRINTER PORT

CAPACITY	MODEL/TYPE	EXT.
120MB	TRAKKER 120	$349
250MB	TRAKKER 250	$399

IRWIN®

An Archive® Company

RUNS OFF FLOPPY PORT

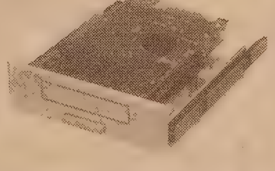
CAPACITY	MODEL/TYPE	INT.
120MB	ARC120	$135
250MB	ARC250	$189

PARALLEL PRINTER PORT ***EXTERNAL*** TAPE BACK-UP

RUNS OFF PARALLEL PRINTER PORT

CAPACITY	MODEL/TYPE	EXT.
120MB	AccuTRAK 120	$379
250MB	AccutRAK 250	$439

SUMMIT™ MEMORY SYSTEMS INC



WITH CENTRAL POINT BACKUP SOFTWARE

RUNS OFF FLOPPY PORT

CAPACITY	MODEL/TYPE	INT.
250MB	SE-250	$189

BACKUP SOFTWARE

DESCRIPTION	PRICE
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NovaStor

BEST BACK UP SOFTWARE

DESCRIPTION	PRICE
NovaBack for DOS	$99
NovaBack for OS/2	$149
NovaNet-Server Based Software (up to 100 users)	$499

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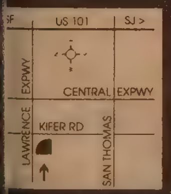

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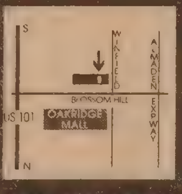

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- *For* MAC or IBM

INTERNAL	EXT. W/CART.
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HYPERSPACE

- 5.25" Optical Cart.
- 650 Mbyte Rewrtiable
- 3600 RPM
- SCSI Optical

INTERNAL	EXTERNAL (no cart.)
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CAPACITY	SINGLE	5-PACK
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128Mbyte, 3.5" Rewritable Optical Disk Drive

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- Fits in floppy slot
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COREL SCSI!! APPROVED PRODUCT

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Multifunction Magento-Optical Disk Drive for 1-Gbyte and 650-Mbyte Rewritable and WORM Disk Cartridges, With up to 4-Mbytes Read/Write cache

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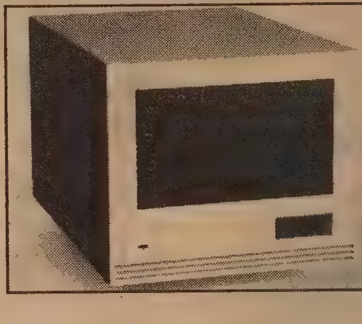

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- External SCSI
- 35ms

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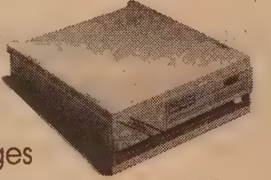
BERNOULLI



- SCSI Interface
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- 18ms Acces time
- 150MB, 105MB, 65MB, 35MB Capacity

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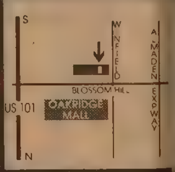

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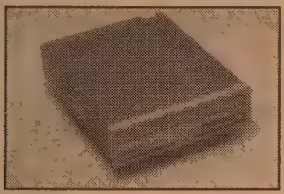

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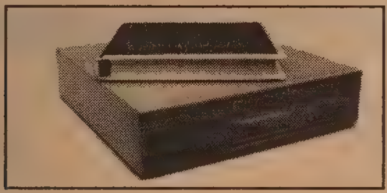

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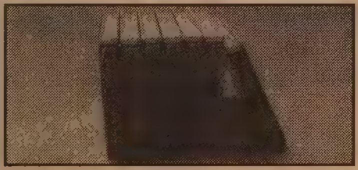
☐ CARTRIDGES



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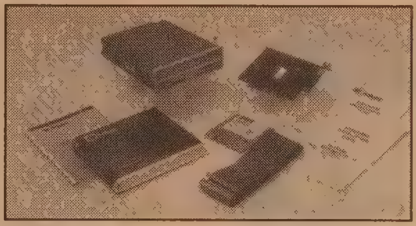

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- CABLES
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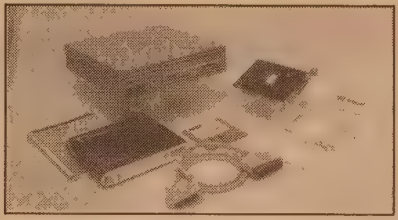

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- CARTRIDGE
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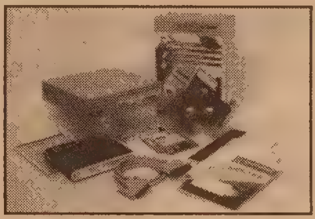

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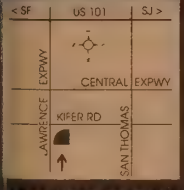

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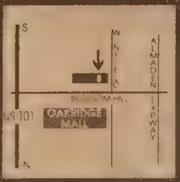

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Audio Solutions for Notebooks & IBM PC with a parrallel Port.

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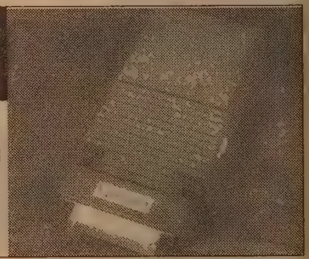

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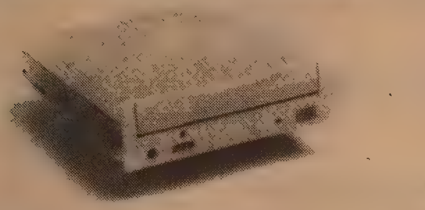

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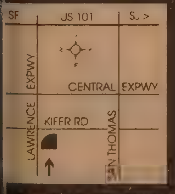

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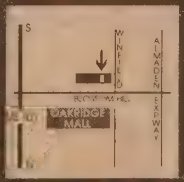

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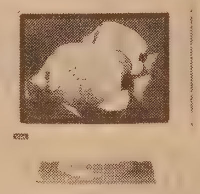
MGC



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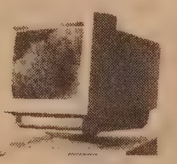

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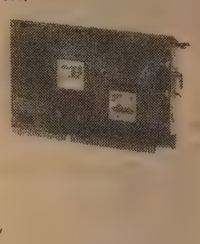

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- Multimedia Video Accelerator

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- Bundled software includes:
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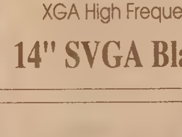

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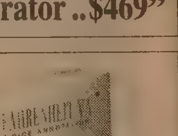

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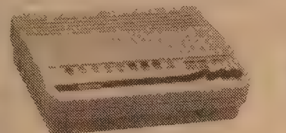

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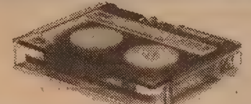

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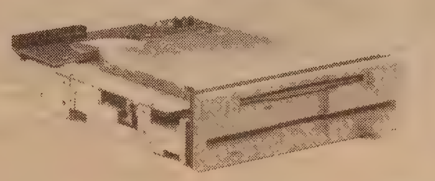

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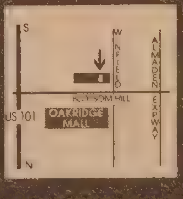

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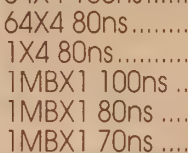

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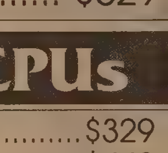

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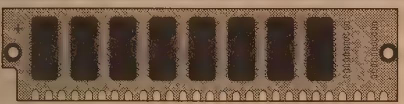

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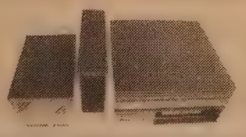

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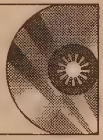

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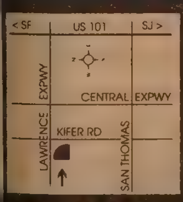

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Continued from page 192

A 32-page *Operations Manual* presents the information you need to get started. The 146-page *Reference Manual* includes detailed explanations of every game function, along with extensive background information and designer's notes. The variety of game options and functions is such that you will need to study the manual to play effectively. A quick reference card details terrain effects and unit symbols.

The V for Victory series sets a new standard of quality for computer-based historical wargames. A third title on Operation Market Garden (the Allied airborne invasion of Holland in 1944) is under development. (Three-Sixty Pacific, Inc., 2105 South Bascom Ave., Suite 165, Campbell, CA 95008. 408/879-9144)

TELECOMMUNICATIONS REVIEW

WORLDLINK

Published By: Intercon
For: Macintosh and PC
Reviewed By: Bill Gram-Reefer

WorldLink is a new way to access the Internet. When you purchase a monthly WorldLink subscription from Intercon, the beginning, or Lite version, service gives you an Internet email address. You have the option of additional capabilities, such as news and FTP (File Transfer Protocol) capabilities—all for one low monthly fee.

In addition to the account and privileges, you get an easy-to-use software interface that, like CompuServe's Navigator, calls the local access number, retrieves and sends email and/or file requests, and downloads FTP files. You can do most of your work offline, including writing and reading mail.

There are some drawbacks, like no Telnet capabilities. Luckily, for finding FTP files, you can easily access Archie, a server in Montreal, Quebec, that currently tracks the contents of eight hundred anonymous FTP sites containing over one million files representing well over 50GB of data. WorldLink includes an adequate users' manual to get you started.

Available for Macintosh and PC, WorldLink Lite (just email) is $19 amd $29 for 1200–2400bps and 9600bps respectively. WorldLink Basic Service, which includes mail and 50MB of news and FTP per month is $29 and $39 depending on the transfer speed you select. A wireless option is coming, as are more toll-free Class A phone numbers for local access. Be forewarned that all changes to the status of your account, except termination, incur a $19 fee.

Not only is the software itself free, you can get a free trial to set up an account for one month. After one month the account is terminated, or you can convert it into a permanent account. (Intercon Systems Corp., 950 Herndon Pkwy., Suite 420, Herndon, VA 22070. 1-800-638-2968)

PC SOFTWARE REVIEWS

VIRTUAL REALITY STUDIO V2.0

Designed By: Ian Andrew
Programmed By: Kevin Parker
Published By: Domark
For: MS-DOS (640K, EGA or VGA graphics, 12MHz or faster CPU, mouse recommended, supports major audio cards)
List Price: $99.95
Reviewed By: Mike Markowitz

Ever since Italian Renaissance artists invented visual perspective back in the XIVth century, the representation of three-dimensional reality on a two-dimensional display surface has been a source of endless challenge and frustration to painters, graphic designers, cartographers, and most recently, computer programmers. The computer screen is a two-dimensional window, but we inhabit a three-dimensional world. The market for military flight simulators stimulated this technology, since spending serious money on high-fidelity computer animation helps to avoid cratering the landscape with $20 million aircraft and irreplaceable flight instructors.

More recently, Virtual Reality, or VR, has come into popular use to describe a variety of computer techniques for simulating the experience of motion and interaction with objects in three-dimensional space. Commercial applications of VR require fast, powerful processors and specialized hardware, such as helmets and gloves. Like multimedia, the term virtual reality can be used to market almost anything. Consider Domark's Virtual Reality Studio 2.0. Originally developed for the Amiga, this is a 3-D modeling and animation package that incorporates an elegant little programming language. You can save your creations as standalone executable files.

Objects are limited to geometric primitives, such as lines, rectangles, cubes, pyramids, and spheres. You can move objects around, or move "yourself" (the view window) by typing in coordinates, or by clicking buttons on a graphic control pad. Objects can be assigned various properties. The manual includes an extensive but poorly written tutorial. There is a "clip art" collection of almost one hundred ready-made objects you can import and play with, including vehicles, household objects, buildings, and creatures. The program also includes Sound Editors for the PC's built-in beeper and the Ad Lib and Roland audio cards.

Edges of objects are quite jagged; there is no "anti-aliasing" or rendering. There is only one diffuse light source: the program does not generate shadows.

Virtual Reality Studio would be a good introduction to 3-D modeling and object animation and a nice system for prototyping simple games. The command language would require considerable study and practice to master, but it provides elaborate animation and object transformation controls. Despite its quirky user interface and poor documentation, this program delivers some impressive results on low-budget hardware. (Domark, Inc., 1900 S. Norfolk, Suite 202, San Mateo, CA 94403. 415/513-8929)

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(3 Slots Local Bus) w/256K	685	865
w/128K	660	840
ISA		
486DX2-66		
(3 Slots Local Bus) w/256K	704	884
w/128K	679	859
486DX-50		
(3 Slots Local Bus) w/256K	633	813
w/128K	608	788
486DX-33		
(3 Slots Local Bus) w/256K	482	662
w/128K	457	637
486DX2-66		
(2 Slots Local Bus) w/256K	640	820

SYSTEM	MB +CPU	BASIC SYSTEM
486DX-50		
(2 Slots Local Bus) w/256K	$569	$749
486DX-33		
(2 Slots Local Bus) w/256K	429	609
486-50 w/256K	562	742
w/64K	537	717
486-33 w/256K	416	596
w/64K	391	571
386-40 w/128K	143	323
386-33 w/128K	142	323
386SX-33	86	266

BASIC SYSTEM INCLUDES: 486/386/286 Motherboard • 486/386/286 CPU • 1 MB RAM • 101 Keyboard • 1.2 MB or 1.44 MB Floppy Drive • Baby AT or Mini Tower Case with Power Supply • 2FDD & 2HDD Controller Card w/Cable

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MOTHERBOARDS W/O CPU

EISA	
486DX2-66, DX-50, DX-33	
3 Slots Local Bus (AIR) w/256K	$413
w/128K	388
ISA	
486DX2-66, DX-50, DX-33	
3 Slots Local Bus (AIR) w/256K	204
w/128K	179
486DX2-66, DX-50, DX-33	
2 Slots Local Bus (GENOA) w/256K	140
486-50 w/256K	136
486-50 w/64K	108
486-33 w/256K	129
486-33 w/64K	103
386-40 w/128K	89
386-33 w/128K	88
386SX-33 w/CPU	86

CASES

Baby AT Case w/200W PS	$49
Mini Tower Case w/200W PS	49
Big Tower Case w/230W PS	95
Mid Tower Case w/230W PS	75
Super Tower Case w/250W 2 Fans	139

VIDEO CARDS

MGP Card	$10
Diamond Stealth 1 MB VL VGA	163
Orchid Fahrenheit VL VGA	170
VGA 800 x 600 256K	25
VGA 1024 x 768 512K	35
VGA 1024 x 768 1 MB	53
VGA Tseng Lab 1024x768 1 MB Hi-Color	89

MONITORS

Mono 12"	$71
Mono 14"	86
SVGA 14" .39	218
SVGA .28.	249
SVGA .28 Non Interlace	297
ViewSonic 6E	335
ViewSonic 6FS 15"	619
ViewSonic 7 17" .28	1020
ViewSonic 8 20" .25	1570
NEC 3FGX 15"	649
NEC 4FGX 16"	745
NEC 5FGX 17"	1350
SONY 1304	549
SONY 1604 16"	1019

RAM

4 MB-60ns Simm	$145
4 MB-70 Simm	135
1 MB-60	35
1 MB-70	32
256K 70 Simm	10

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Teac 1.2 MB FDD	52
Teac 1.44 MB FDD	46
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CP3000 42 MB 28ms	$119
CP30064H 60 MB 19ms	150
CP30084E 85 MB 19ms	178
CP30104H 120 MB 19ms	194
CP30174 174 MB 17ms	218
CP3204F 212 MB 16ms	289
MAXTOR	
7120A 130 MB 15ms	$195
7213A 213 MB 15ms	279
LXT 340A 340 MB 15ms	575
LXT 213SY 213 MB 15ms SCSI	299
LXT 340S 340 MB 15ms SCSI	575
XT 8760S 675 MB 16ms SCSI	1070
XT 8760E 676 MB 14ms ESDI	1078
PO-12S 1.02 GB 13ms SCSI	1298
PI-17S 1.5 GB 13ms SCSI	1518
FUJITSU	
ESDI	$131
M2623FA 425 MB	803
M2624FA 520 MB	864
M2266SA 1.2 GB	1210
M2652SN 2 GB	2200

CONTROLLER CARDS

IDE 2 FDD/2 HDD 1:1	$12
IDE VL 2 FDD/2 HDD 1:1	58
SCSI Controller	59
SCSI Ultra 24F (EISA) Future Domain	440
SCSI Ultra 14F	210
SCSI DTC 3290 AS (EISA) w/512K cache up to 4 MB	440
SCSI DTC 3280K	129
SCSI Adaptec AD 1742K (EISA)	475
SCSI Adaptec AD 1542B	255
Promise PM-20440 (SCSI) w/o Cache up to 16MB	231

MODEM CARDS

2400 Int/Ext Modem	$35/88
2400 MNP5 External	101
9600 Internal Modem	170
9600 External Modem	275
9600 Fax/2400 Modem	56

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101 Keyboard	$19
101 Click	22
Keytronic Keyboard	33
Track Ball 101 K	67
Logitech Mouseman	62

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Mouse	$12
Super I/O	15
AT I/O Card (2S/1P/1G)	10
MS DOS 6.	45
Windows 3.1	35
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Tape	19
Tape Back-Up 120MB Controller Card AB10	69
250 MB Colorado Tape Back-Up	209
Archive 250 MB Tape Back-Up	189
Tape	24
Tape Back-Up 250MB Controller Card FC10	99
Tape Back-Up 250MB Controller Card TC15	189
Sony 535 CD-ROM (600 MB)	379
NEC CD-ROM	499
Diskette Box	7
Power Center	15

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EtherPerfect EP-301	$94
NE 2000 16-Bit	55
NE 1000 8-Bit	55
ARCNET LAN CARDS	
16 Bit	$58
8 Bit	39

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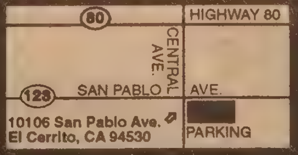

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AMIGA SOFTWARE REVIEW

MEGAD 2.0

Published By: John L. Jones
List Price: $30
Reviewed By: Douglas J. Nakakihara

John Jones has released an incredible directory utility program for the Amiga. While most utilities limit you to only two directory windows, MegaD lets you open multiple floating windows, limited only by the computer's memory and your sanity. You can move, size, and flip them to the front or back—just like Workbench windows. This flexibility lets you do things like copy files to multiple directories. This also minimizes reloading previously listed directories, since they can stay right on the screen. Use MegaD on a 1280 x 400 super hi-res interlaced screen for lots of window room.

MegaD also lets you double-click on literally any data file and have it automatically boot the program that uses it! For example, double-click on a graphic file and it will be displayed using your favorite graphics viewer like Superview. Of course, you must first teach MegaD to recognize the data files, but it's as simple as highlighting the main program and a few example data files.

There are buttons galore for all of the essential file maintenance chores like copying, moving, deleting, etc. There are also user-definable buttons with a multitude of configuration settings. MegaD also provides an easy method for arcing or unarcing files using various compression programs. MegaD will even print disk labels! This only touches the surface of its features. Highly recommended! A demo version is available on many BBSes. (John L. Jones, PO Box 292, Midvale, UT 84047)

ART EXPRESSION

Published By: Soft-Logik Publishing Corp.
List Price: $249.95
Reviewed By: Douglas J. Nakakihara

Art Expression is a new structured drawing program for the Amiga. If there is anything especially exciting about this product, it is the fact that you can load, view, edit, and save Adobe Illustrator Encapsulated PostScript (EPS) files. This opens the Amiga to a world of clip art, since EPS is the de facto standard file format used on many computer platforms. The IFF DR2D format is also supported. GoldDisk ProDraw clips can be used, but they must first be converted using a utility provided with Art Expression. Unfortunately, graphics cannot be saved as or converted into ProDraw format.

Soft-Logik has provided a very intuitive interface which makes learning Art Expression a fairly easy task. The position and dimensions of objects are always visible, and these settings can be edited numerically for extreme precision.

All of the basic editing tools are included plus some very powerful transformation and special effects like fills, distort, blending, flattening and smoothing paths, repeating with variable copies, and rotation. Adobe Type 1 fonts are supported, and you can automatically align

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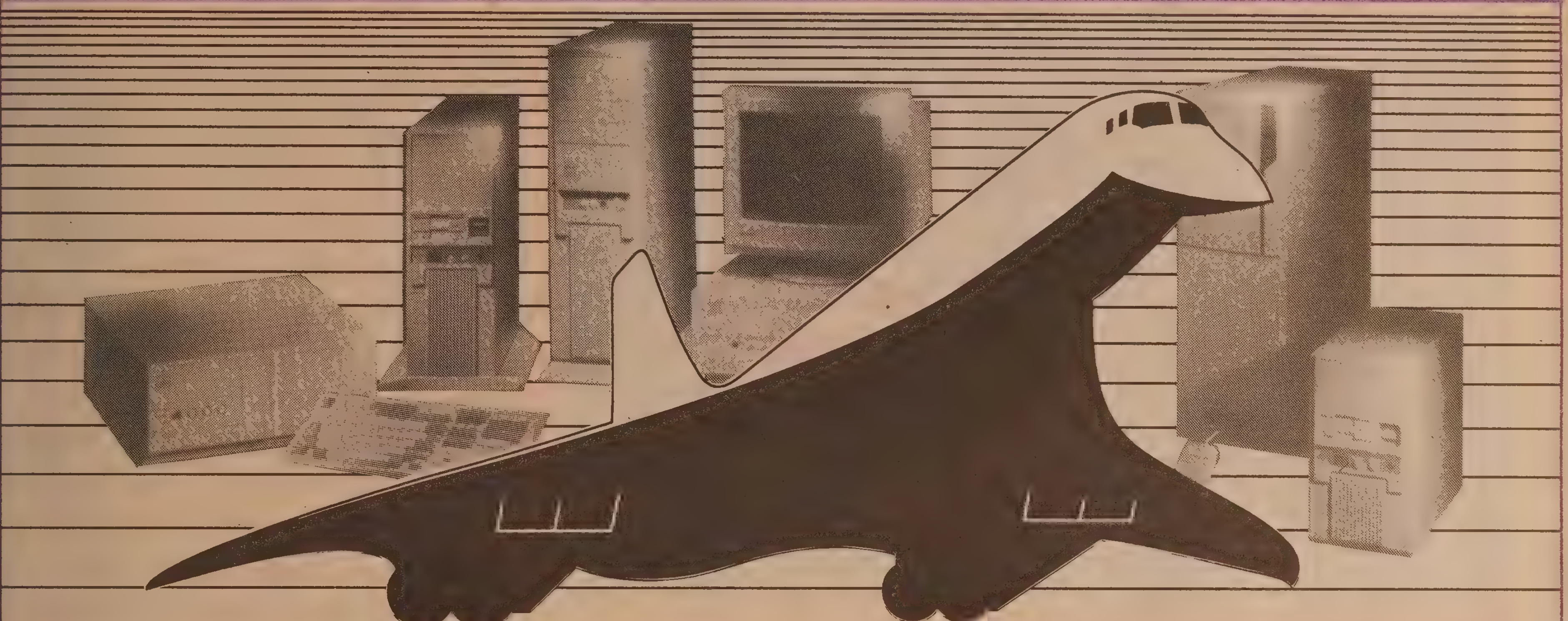

386DX-40

130MB Drive VGA System

- AMD 80386SX processor
- AMI Bios
- 128K High-speed cache SRAM
- 4MB Fast-page mode 70ns RAM
- Mitsumi 1.2 and 1.44MB Floppy Drive
- Maxtor 130MB Hard Drive
- Cirrus Logic 16-Bit 256 Color SVGA Card w/1MB
- 2S/1P/G ports
- IDE Interface
- Mini-Tower Case
- 230W List Power Supply
- 14" .28 Interlaced SVGA Monitor (1024x768)
- 101 Enhanced Keyboard
- Landmark Speed Running at 66MHz

$999

486DX-33/50

170MB Drive VGA System

- Intel 80486DX co-processor (w/8K Cache & Math Co-processor)
- AMI Bios
- 256K High-speed cache SRAM
- 4MB Fast-page mode 70ns RAM
- Teac 1.2 and 1.44MB Floppy Drive
- Quantum 170MB Hard Drive
- Diamond SpeedStar 24X True Color w/1MB
- 2S/1P/G ports
- IDE Interface
- Mini-Tower Case
- 230W List Power Supply
- 14" .28 Non-Interlaced SVGA Monitor (1024x768)
- 101 Enhanced Keyboard
- Landmark Speed Running at 151MHz/200+MHz

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486-33/66 VESA Local Bus

213MB Drive VLB System

- Intel 80486DX-33/66 processor (With 8K cache & Math Co-processor)
- Opti VESA chip-set
- AMI Bios
- 2 VESA Standard Local Bus
- 128K High-speed cache SRAM
- 4MB Fast-page mode 7ns RAM
- Teac 1.2 and 1.44MB Floppy Drive
- Maxtor 213MB Hard Drive
- 32 Bit VESA ET4000 SVGA 1MB Card
- IDE Interface
- 2S/1P/G ports
- Mini Tower Case
- 230W List Power Supply
- 14" View Magic 72MHz SVGA Monitor (1024x768)
- Keytronic 101 Enhanced Keyboard
- Landmark Speed Running at 200 MHz

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Orchid VESA Local Bus

245MB Drive VLB System

- Intel 80486DX-50 processor (w/8K Cache & Math Co-processor)
- AMI Bios
- 2 VESA Standard Local Bus
- 256K High-speed cache SRAM
- 8MB Fast-page mode 7ns RAM
- Teac 1.2 and 1.44MB Floppy Drive
- Maxtor 245MB IDE Hard Drive
- 32 Bit Orchid Fahrenheit VLB SVGA 1MB
- 32 Bit IDE Controller
- 2S/1P/G ports
- Mid-Tower Case
- 230W UL Power Supply
- 14" View Magic 72MHz SVGA Monitor (1024x768)
- Focus 2001 Keyboard

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MOTHERBOARDS W/CPU

386 Upgradable to 486	$CALL
486DX-50 W/256K Cache	650
486DX-33 w/256K Cache	500
386DX-40 w/128K Cache	195
386DX-25/33	125/40

VIDEO ADAPTERS

16-bit SVGA w/1MB	$60
Diamond SpeedStar 24X	165
Diamond Stealth w/1MB VRAM	220
MGP Card	15

FLOPPY DRIVES / HARD DRIVES

1.2 5 1/4" Floppy Drive	$58
1.44 3 1/2" Floppy Drive	49
20MB IDE	99
40MB IDE	130
80MB IDE	180
130MB IDE	210
170MB IDE	250
200MB IDE	280
340MB IDE	500
120MB Tape Drive	180
250MB Tape Drive	235

MONITORS

14" .28 Interlace w/Trident 1MB	$310
14" .28 Non-Interlace w/Trident 1MB	350
15" NEC 3FGX/4FG	640/750
17" NEC 5FG	1395
Viewsonic 6E/5E	330/410

FD/HD CONTROLLERS

IDE 2HD/2FD	$15
IDE 2HD/4FD	45
IDE 2HD/2FD/2S/1P/1G	17
4FD For AT/XT	40
2FD For AT/XT	30
IDE Cache Controller	145
Orchid 32 Bit VLB IDE/IO	85

PRINTERS

Epson LQ 1070C	$360
Fujitsu DL 3600	360
HP IIP+/IIIP	795/999
HP DeskJet 500/500C	399/600
HP DeskJet 550	750
Okidata OL400/OL800	599/1070

MISCELLANEOUS

AT I/O 2S/1P/1G	$15
AT I/O 2S/1P/1G W61550CN Chip	70
2400 Int. Modem	40
96/24 Int. Fax/Modem	60
96/14.4K Int. Modem	210
9600 Int. Modem	180
QIC Mouse	25
Silver Mouse w/Pad	20
Track-ball	30
Logitech Scanner w/OCR	300
Microsoft Mouse	50
Logitech Trackman	95
Logitech Mouseman	40
Logitech Firstmouse	35

SOFTWARE

MS Access 2.0	$99
MS-Windows 3.1	80
MS-Word 2.0	285
MS-Excel 4.0	285
MS-Draw 2.0	120
Aldus Page-Maker 4.0	500
Lotus for Windows	330
Harvard Graphics 3.0	320
WinFax Pro 3.0	120

Shareware Available

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AIR ISA VESA Local Power Station

m486 AIR ISA 3 Slot VESA LocalBus 256K Cache Motherboard
m8MB 70ns SIMM RAM (1M-70ns SIMMx8)
m1.2M & 1.44M TEAC Floppy Drives
m213MB IDE Western Digital 64K Cache Harddisk
mVESA LocalBus 32Bit IDE Controller with 2S/1P/1G
mVESA LocalBus Cirrus-Logic 1MB Accelerator 12M WinMarks
m14" 1024X768NI 0.28DP Impression Monitor
mPremium Mini Tower 230W PS
m101 KeyTronic Keyboard

486-33SX	$1573
486-33DX	$1694
486-50DX/2	$1820
486-66DX/2	$1919

See The Difference! With this name brand AIR motherboard, you get 3 VLB slots, all with Bus mastering capability, Intel P5 Overdrive support and guarranteed future compatiblity, you are definitely buying into future with this motherboard! Our VLB 32Bit IDE controller boosts harddisk performance to 2650KB/sec data transfer rate (by CORETEST V2.90), three times on average faster than regular ISA Bus! Our Cirrus-Logic Windows Accelerator also buys you incredible video performance of 12Million Winmarks and 8777 Character/ms in DOS (Landmark V2.0). Optional upgrades give you various combination for your various needs. Another technology advance and price breakthrough brought to you from us! No one can offer you this perfect machine at this perfect price, we guarrantee it! We 'vealso added the 33SX version for those of you who don't need the math coprocessor feature.

Recommended Upgrades:

Orchid Fahrenheit VLB STD/VA/P9000	add$69/89/330
Diamond VLB Stealth 24/Pro/Viper	add$64/250/330
Promise 1MB/4MB Cache VLB 4030VL	add$235/324
Western Digital HD 170/250/340MB	add$-40/30/135
UltraStor SCSI-2 VLB 34F + SCSI HD	add$Call
Premium DeskTop/Med/Full Tower	add$5/25/45
KFC 14/15/17" Multisync Digital Monitor	add$78/190/575
Sony/NEC/Viewsonic/Nanao/Mag	add$Call
Mouse/DOS V5.0/6.0/Windows V3.1	add$Call

AIR EISA VESA Local Power Station

m486 AIR EISA 3 Slot VESA LocalBus 256K Cache Motherboard
m8MB 70ns RAM 72 Pin SIMM
m1.2M & 1.44M TEAC Floppy Drives
m340MB Western Digital Harddisk 64K Cache
mPromise DC-4030VL VESA LocalBus IDE 1MB Cache Controller
mDiamond Viper VLB Windows Accelerator 44M WinMarks
mKFC 15" 1280X1024NI Multisync, Digital Controlled, Flat-Screen
mPremium Medium Tower 230W PS
mI/O 2S/1P/1G
m101 KeyTronic Keyboard

486-33SX	$2739
486-33DX	$2860
486-50DX/2	$2986
486-66DX/2	$3085

The highest-end you can find! AIR EISA VESA LocalBus Motherboard supports P5 Overdrive & 256MB Memory on board. Yes! 256MB using 72Pin 64MB SIMM! (Soon to be released) Great news for Imaging and Photographic software users! And with Full 8 EISA slots and 3 VESA LocalBus extensions, you can plug in any different bus cards you want! We bundle this machine with a 286 CPU built-in Promise DC-4030VL 1MB Cache Controller and rockets the Data Transfer Rate to more than 7000KB/Sec! This amazing controller supports 4HD/4FD and transfers up to 14.3MB/Sec. Besides we add a Diamond Viper VLB and make the Windows fly at more than 45 Million WinMarks. Believe it, you won't find a machine performs closer to this at any price!

Recommended Upgrades:

72Pin SIMM to 16MB/32MB/64MB	add $270/984/2238
Ultrastor SCSI-2 VLB 34F + SCSI HD	add $Call
Premium Full Tower	add $20
KFC17" Multisync Digital-Control Monitor	add $385
Sony/NEC/Viewsonic/Nanao/Mag	add $Call
Mouse/DOS V5.0/6.0/Windows V3.1	add $Call

Reminder: It makes no sense to buy an VLB system without Harddisk Controller and Video card on VLB. You aren't taking the advantage of the VLB! Be careful!

Basic System Includes: 486 Motherboard & Intel CPU, 1MB RAM-70ns, 2HD/2FD IDE Controller with 2S/1P/1G, 1.2M Teac Floppy Drive, Standard Mini-Tower Case with 200W Power Supply, 101 Key Enhanced Keyboard.

486 ISA System Configuration	486SX 25MHz w/128K	486DX 33MHz w/128K	486DX/2 50MHz w/128K	486DX 50MHz w/128K	486DX/2 66MHz w/128K
Basic System	$407	$558	$684	$700	$783
Basic System plus 85MB HD, 512K SVGA Card & .39DP Monitor	$826	$977	$1103	$1119	$1202
Basic System plus 4MB RAM, 85MB HD, 1.2&1.4FD, 512K SVGA & .39DP Monitor	$963	$1114	$1240	$1256	$1339
Basic System plus 4MB RAM, 130MB HD, 1.2&1.4FD, 512K SVGA & .39DP Monitor	$1008	$1159	$1285	$1301	$1384
Basic System plus 4MB RAM, 213MB HD, 1.2&1.4FD, 512K SVGA & .39DP Monitor	$1068	$1219	$1345	$1361	$1444
Basic System plus 8MB RAM, 130MB HD, 1.2&1.4FD, 512K SVGA & .39DP Monitor	$1136	$1287	$1413	$1429	$1512
Basic System plus 8MB RAM, 213MB HD, 1.2&1.44FD, 512K SVGA & .39DP Monitor	$1196	$1347	$1473	$1489	$1572
Basic System plus 8MB RAM, 340MB HD, 1.2&1.44FD, 512K SVGA & .39DP Monitor	$1331	$1482	$1608	$1624	$1707

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Multimedia Upgrades

CD-ROM:

Toshiba XM-3401B SCSI 256K Cache	
200ms, 330KB/Sec, Multi-Spin/Speed Internal	$479
Optional 8 Bit CD Controller w/ Software Driver	add$79
NEC CDR-84 Internal SCSI 280ms Multi-speed 300KB/S	$529
Optional 8 Bit Controller w/ Software Driver	add$79
Creative Labs Multimedia Starter Kit includes:	
CD ROM, Sound Blaster Pro, MS BookShelf, etc.	$485
Sony 31A CD ROM Kit includes:	
8-Bit Controller, Driver & Selected CD Titles	$395

Sound Card:

ProAudio Spectrum 16 w/ SCSI Interface	$185
Creative Labs Sound Blaster Pro Basic	$145
Creative Labs Sound Blaster Pro w/MIDI	$175
Creative Labs Sound Blaster 16Bit	$245
CD-ROM Titles:	$Call

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Components/Upgrades

Motherboard without CPU (Call for CPU Prices)

486 ISA 128K Cache (25/33/50MHz-SX/DX/DX2)	$100
486 ISA VLB 128K 2 VLB Slots Symphony Chipset	$130
486 AIR ISA VLB 256K 3 VLB Slots (33/50MHz) P5 Support, Bus-Mastering, US Made	$228/240
486 AIR Full EISA VLB 256K 3 VLB Slots (33/50MHz) Upto 256MB using 72Pin SIMM 8 EISA slots + 3 VLB Extensions, US Made	$465/500
486 ELISA VITAL Full EISA VLB 256K 3 VLB Slots, US Made uses 72Pin SIMM, Cache upto 1MB, ZIF Socket 8 EISA + 3 VLB Extensions, Upto 50MHz	$400
486 Orchid VLB SuperBoard 256K Cache Rev. C, 2nd Version 2 VLB Slots, Bus-Mastering, Upto 50MHz	$242

Memory:

1MB RAM (256K-70ns SIMMx4)	$39
4MB RAM (1M-70ns SIMMx4)	$128
16MB RAM (4M-70ns SIMMx4)	$580
72Pin 70ns SIMM Module (4MB/8MB/16MB)	$150/270/627

Controller Card:

AT I/O 2S/1P/1G	$12
AT I/O 2S/1P/1G with High Speed 2 UART 16550's	$45
16Bit IDE 2FD/2HD with 2S/1P/1G	$14
IDE Caching Controller Card Upto 64MB, 2HD/4FD	$139
VLB 2FD/2HD IDE Controller w/ I/O (Upto 33MHz)	$56
Orchid 2nd Revision VLB IDE w/ I/O (Upto 50MHz)	$80
DTC 2270VL VLB IDE w/ I/O (Upto 50HMz)	$86
Promise DC-4030VL VLB IDE w/ 1MB Cache	$240+39
UltraStor SCSI-2 VLB 32K Bus-Mastering 34F	$285
UltraStor 34FK including 34F + Software Driver Kit	$340
AIR EISA SCSI-2 VLB Bus-Mastering Controller Upto 50MHz, Supports EISA/VLB	$340
AIR VESA LB 32Bit Ethernet Adaptor	$320

Video Card:

16Bit 512K/1MB Trident SVGA 1024x768	$39/59
16Bit 1MB Tseng-4000 72Hz 32K Color	$81
SpeedStar 24X Accelerator 1MB 16.7M Color	$150
Tseng ET4000 VESA LB 1280x1024 16.7M Color	$108
VLB Cirrus Logic Windows Accelerator 1MB	$110
Genoa WindowsVGA 8500VL VLB 1MB	$125
Orchid Fahrenheit VLB w/1MB (Upto 50MHz) Standard/Voice Annotation	$179/199
Orchid P9000 VLB 3MB 44Million Winmarks	$440
Diamond Stealth 24 VLB 1MB DRAM S3-805	$174
Diamond Stealth Pro VLB 2MB VRAM S3-928	$360
Diamond Viper VLB 2MB VRAM 44M Winmarks	$440
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- Premium Mini Tower 230W PS
- 101 KeyTronic Keyboard

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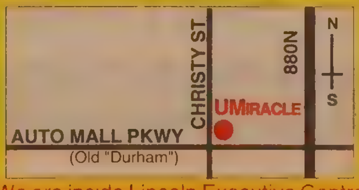

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text to paths or make it fill a shape.

A bit-mapped editor with a tracing function is also included. Documentation is first rate as is the tutorial. For complex graphics, Art Expression could use a feature that cycles through each object on a page. Since I am a Professional Page user, I also wish it worked directly with ProDraw clips. (Soft-Logik Corp., PO Box 510589, St. Louis, MO 63151-0589. 1-800-829-8608)

GIGAMEM

Published By: Pre'spect Technics, Inc.
List Price: $98
Reviewed By: Douglas J. Nakakihara

Always running out of RAM? Well, GigaMem, from Pre'spect Technics, may be for you. GigaMem provides an inexpensive way to increase available RAM by allowing your hard drive to simulate up to 1GB of memory!

Before a program will use this virtual memory (VM), the program must be set up in GigaMem's preference screen. Many commonly used programs are already configured, and adding a new one is simple. Essentially, GigaMem must know if a program can use VM and what type of memory should be used first. You have the choice of using either a file or full partition as VM, though the later is substantially faster.

Naturally, even with the fastest hard drive, VM is slower than real RAM and a fair amount of RAM is needed to use GigaMem, since a portion of it must be set aside as a buffer (one-half of your RAM is recommended). Also, when you run a program, it will first load into regular RAM. So even with 30MB of VM, you can't run more programs than will fit in available real RAM. VM is only used when a program makes certain memory allocation calls. Fortunately, many programs, like Art Department Pro, ImageFX, Image Master, and Imagine, will take full advantage of the VM.

This is a wonderful program. It is easy to install and operates flawlessly. CPU with MMU required. (Pre'spect Technics, Inc., P.O. Box 53, Rte. de Lotbiniere, Dorion, Quebec, Canada J7V 2K0. 514/944-9696)

DCTV RGB CONVERTER

Distributed By: Digital Creations
List Price: $199
Reviewed By: Douglas J. Nakakihara

The DCTV RGB Converter allows you to view a DCTV image on a standard Amiga monitor. Without the converter, the only way to view DCTV images is using a composite monitor. While the standard Amiga 1084-series monitors have a composite signal input for viewing just such images, multiscan monitors, like the Amiga 1950 and 1960, don't have a composite input.

The RGB display is much crisper than composite. However, the image is still not pixel-based RGB, it remains a composite DCTV image. Notwithstanding this fact, the solid display does make the DCTV paint program much more usable. Amazingly, the DCTV display will behave just like a normal Amiga graphics mode. That means you can drag the screen up or down and show a non-DCTV display or flip through screens without a hitch. Yes, DCTV images and images in normal Amiga modes can coexist on the same screen! You can even create mixed-mode images that are part DCTV and part native Amiga. Another benefit is that you can genlock DCTV images over video. These things are just not possible using DCTV alone.

The downside of using the DCTV RGB Converter is that the display is interlaced. Also, on an Amiga 3000, you'll have to purchase a switchbox to toggle between the VGA and RGB outputs. Since the converter connects to the DCTV RGB pass-through, the attachments get a little bulky too.

This converter is highly recommended if you have DCTV. It also provides yet another way to get full-color animation straight off the Amiga. (Digital Creations, Inc., PO Box 97, Folsom, CA 95763-0097)

IMAGE MASTER

Published By: Black Belt Systems
List Price: $249.95
Reviewed By: Douglas J. Nakakihara

Image Master is a 24-bit image processing and painting program from Black Belt Systems. This program's abilities not only far exceed those of its competition, but updates adding more features are released frequently. Space doesn't permit me to list all of the features, but suffice to say Image Master has just about every conceivable processing tool you can think of—and more. Naturally, standard processing tools like brightness, contrast, etc. are included, but Image Master goes way beyond those with processing effects like: morphing, negative, line art, motion blur, solarize, asterization, blue print, water color, posterize, relief and wave distort, to name only a few.

A powerful feature is its ability to modify only a portion of an image. The area can be defined using various shapes or drawn free-hand. Besides image processing, Image Master can also read and write various file formats, including JPEG, IFF, TIFF, Targa, and PCX.

My only dislikes were the "button-for-

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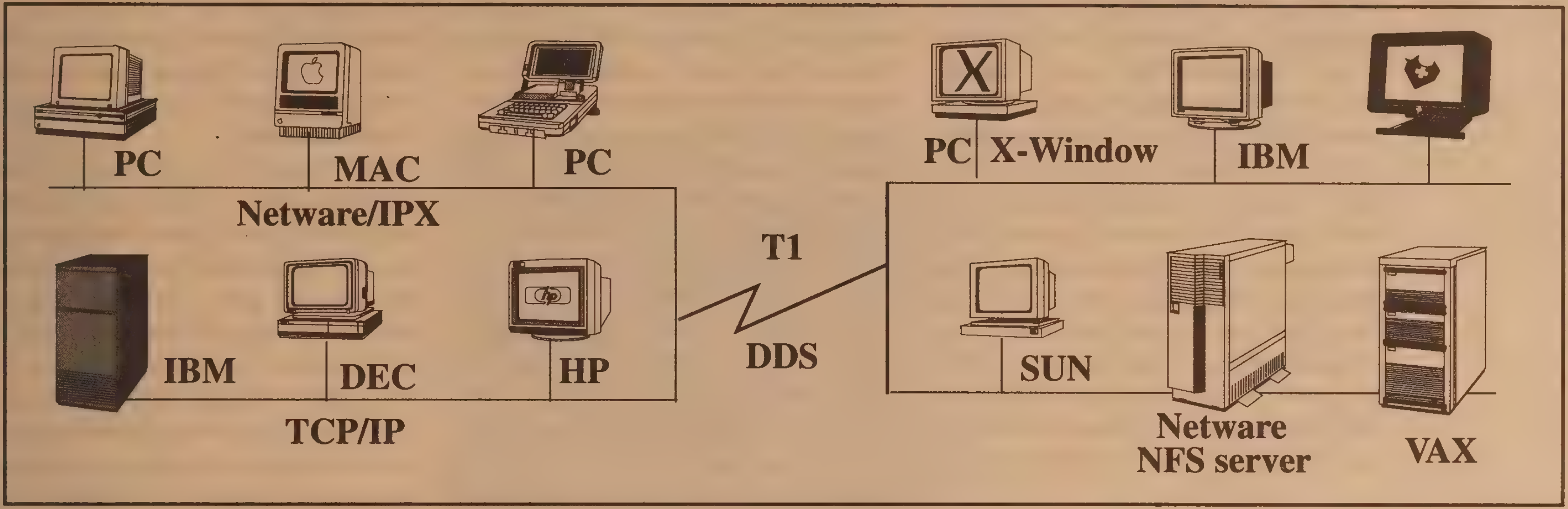

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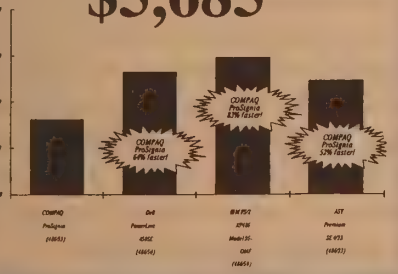

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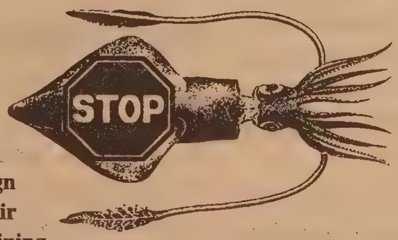

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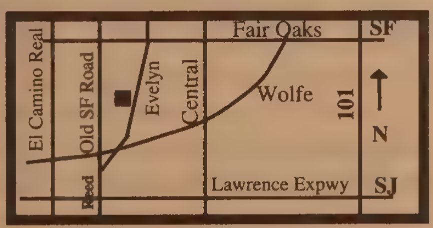

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Not responsible for typographic errors. Subject to stock on hand. Prices subject to change everything" interface and the manual. A more standard interface with pull-down menus, 2.0 gadgets, etc. would be easier to learn. More keyboard equivalents would also be welcome. The manual is accompanied by a 118-page addendum text file. Fortunately, the next major release, v10, is supposed to have a new, fully updated manual. These minor gripes aside, if you are serious about image processing, Image Master is a must have. ARexx and AGA are supported. Special versions of IM are also available for Impulse's Firecracker and Black Belt's HAM-E display devices. (Black Belt Systems, 398 Johnson Rd., Glasgow, MT 59230. 406/367-5509)

MACINTOSH SOFTWARE REVIEWS

BEST BOOKS

Published By: Teleware
List Price: $99
Reviewed By: David Satava, CPA

As a licensed CPA, my pulse increases whenever software is promoted as a non-accounting accounting program. Visions of long and frustrating tax seasons intensify when a manufacturer reports that traditional words like debit, credit, ledger, and posting have been replaced with To, From, and Lists. This is not the case with Best Books, developed by Teleware, makers of MYOB. Best Books was designed for the new and small business owner who does not have any business inventory.

Using the same graphic interface found in MYOB, Best Books successfully simplifies technical accounting jargon, while remaining faithful to "Generally Accepted Accounting Principles." For example, traditionally complex chart of accounts and financial statement design have been replaced with five recipe-like cards labeled Assets, Liabilities, Equity, Revenues, and Expenses. To modify an account or financial statement, simply double-click a card, enter the changes—all in English—and exit.

The program offers numerous reports, including graphical and spreadsheet analysis. Sales can be viewed by product sold, salesperson, and customer. Unfortunately, since the program does not require all fields of information to be recorded, these reports can easily contradict one another. Correcting errors is easy, since you can make the changes directly to the original records. While your accountant will not approve of this feature, bookkeeping novices will appreciate the ease of correction.

One of the nicest features, often lacking in sophisticated accounting packages, is activated by a zooming arrow. This arrow permits the user to go back in time, along the audit trail, and actually view the original document or invoice. If you have ever searched for supporting documents, this feature is priceless.

Best Books is user friendly, faithful to traditional accounting practices, and probably should have been called First Books. (Teleware, Inc., 300 Roundhill Dr., Rockaway, NY 07866. 201/586-2200)

KAI'S POWER TOOLS

Published By: HSC Software
List Price: $149
Reviewed By: Matthew Leeds

Photoshop is a universe unto itself. You can create almost anything with it, and what you can't create directly you can build with some of the third-party tools, or plug-ins, available for it. Kai's Power Tools is a set of thirty-three interrelated filters for creating special effects within Photoshop. The two major sections of Power Tools are the Texture Explorer and Gradient Designer.

The Gradient Designer lets you create blends and gradients with over five hundred colors, allows you to include transparency as an element in a blend, provides a Gradient Path tool that goes far beyond the simple linear or circular gradients in Photoshop, and includes a new color picker much better than that supplied by either Adobe or Apple.

The Texture Explorer provides the creative tools to produce an unlimited selection of textures and backgrounds. All of the textures are created algorithmically, and are resolution independent. The decidedly unique interface makes it easy to explore new variations of textures, save your favorites, and apply them to a selected area of an image.

There are also filters for exploring Mandlebrots and Julia sets, Glass Lens tools for spherizing a selection, new sharpen and diffuse tools, smudge tools, a variety of noise tools, and a few others that are hard to define.

Kai's Power Tools are an excellent creative addition to any Photoshop user's collection. One tip: If you've got the drive space, copy the entire contents of both disks to a folder then decompress, you'll save about a dozen disk swaps. (HSC Software, Inc., 1661 Lincoln Blvd., Suite 101, Santa Monica, CA 90404. 310/392-8441)

MORPH V1.1

Published By: Gryphon Software
List Price: $149
Reviewed By: Matthew Leeds

It's everywhere these days; you see it in television commercials, feature movies, and music videos. I'm talking about a special effect called morphing, that smooth transition from one shape to another. Now it's available on your Macintosh.

Gryphon Software's Morph can be used to create still or QuickTime images that are a blend of two source images. Images can be in either color or black-and-white. Since Morph does not work in real time, it can create full-screen, full-color QuickTime movies that can only be played back with hardware assistance, either via single-frame recording or with one of the new JPEG hardware video cards now available.

Morph can also create standard-sized images and movies that will play back on any Mac. The basic interface is simple. You select the two source images you wish to use. Each appears in a window. You place markers,

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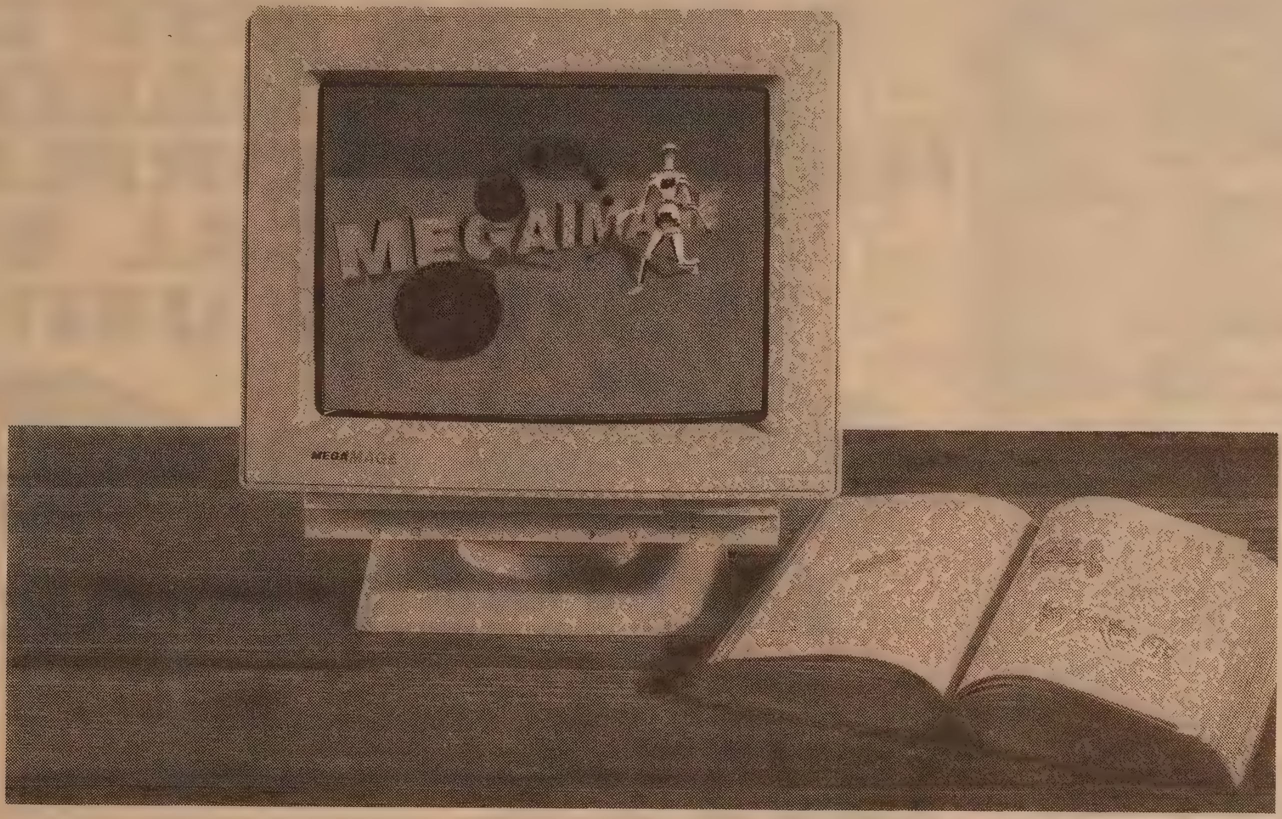

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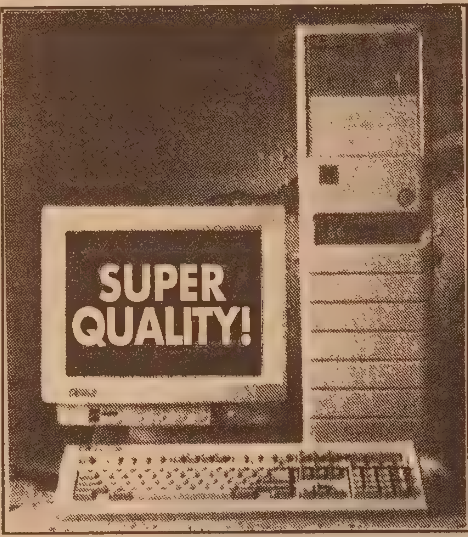

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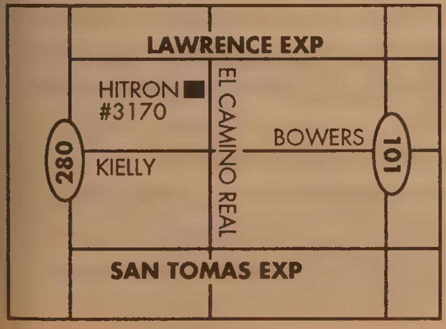

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called "Key Points," on common points in each image. For example, when morphing between two faces, you would place key points on the nose, eyes, ears, etc. The actual process of placing and adjusting key points is slow and tedious, but critical to creating a successful morph. The more points you place, and the more accurate you are in adjusting their placement, the smoother the resulting morph.

You can set the amount of time and number of frames in a morph, the speed of a morph, adjust ease in and out speeds, and save your morph as a PICT, a series of PICTs, a PICS file, or as a QuickTime movie. You'll need a Mac that supports 32-bit QuickDraw v1.2 or greater, a sizable amount of memory, and depending on what you morph, a lot of free space on your hard drive. It takes time and patience to create good morphs with this program, but the results are well worth it. (Gryphon Software, Inc., 7220 Trade St., Suite 120, San Diego, CA 92121)
macintosh software review

NOW UTILITIES V4.0

Published By: Now Software
List Price: $149
Reviewed By: Matthew Leeds

The Mac is a miracle of user interface design with an operating system created to not only access the hardware but to empower the user. Many of the features found in the current version of the System software were first found in commercial system enhancements.

Apple should keep an eye on Now Software for further inspiration. Their latest version of Now Utilities has matured into an excellent paradigm for what future Mac systems may look like.

My favorite component is the Startup Manager. Not only does it let me set the loading order for extensions and control panels, not only does it keep the icons they display from wiping each other out as they march across the bottom of my screen during startup (confirming my status as a power user), not only does it let me create groups (and hot keys to select them), but it traps incompatible extensions during startup and turns them off. Way cool.

There's lots more in Now Utilities. NowMenus and Super Boomerang combine to give me unlimited control over my menus, open and save dialogs, and application launching. I can customize, control, and tweak to my heart's content. WYSIWYG Menus displays my fonts in their own typefaces and groups families of fonts together.

Now Save remembers to save work in progress for me and can keep a backup file of every keystroke so that even if a crashing application trashes its own open document file, I can reconstruct it. Now Scrapbook handles text, graphics, sounds, and QuickTime movies. It shows thumbnail views of files, lets me sort catalogs, scale, crop and resize images, import and export files in a variety of formats, and includes a simple text editor for clipboard text. Now Profile can analyze my machine's configuration and create a detailed report.

You can get some of these features by using various shareware programs; they may not work well together and they certainly can't offer the depth of features found in Now Utilities. Highly recommended. (Now Software,

Continued on page 257

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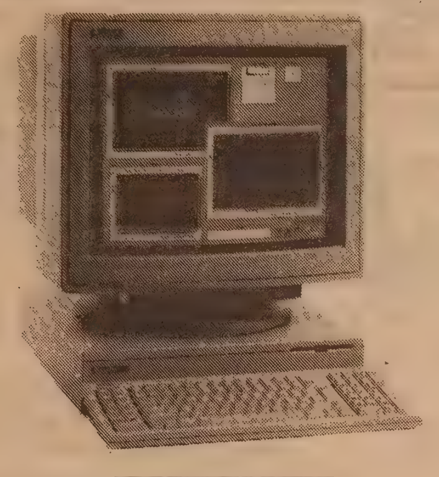

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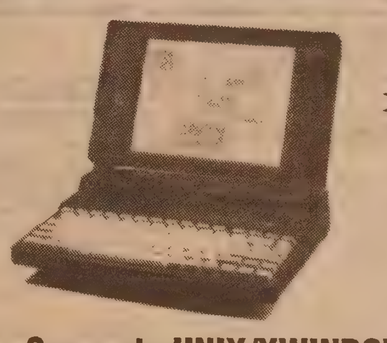

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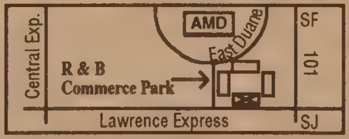

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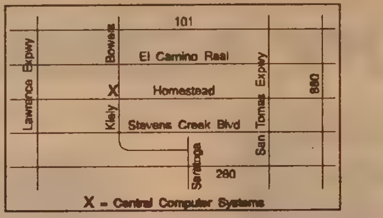

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Interface Kit for PC	89
Multimedia Upgrade Kit Int / Ext	895/995
SONY (w/o software)	
CD 31A w. Kit	235
CDU 541-01 380ms Int (w. controller)	425(515)
CDU 7211 380ms Ext (w. controller)	555(635)
TEXEL	
DM-3024 265ms, Int / w. Kit	365/435
DM-5024 265ms, Ext / w. Kit	445/515
TOSHIBA	
3401B 200ms 300KB/s Int	449
3401E 200ms 300KB/s Ext	569
TRANTOR	
Mini SCSI Plus (Parallel to SCSI Adapter)	159
Music Box v.2 / T130 Interface Kit	29/79
CD SOFTWARE	
About COWS / Aloha! Hawaii	24/29
All American Sports / Amanda Story	39/45
Atlas Pack (World & US)	39
Amazing Universe / Atlas U.S. President	49/29
American Business Phone Book 92	29
Arthur's Teacher Trouble / w. box	35/45
Audubon's Birds	29
Barney Bear Goes to School / to Space	25/25
Battle Chess Multimedia	39/49
Beauty & the Beast / Bible Library (OEM)	35/55
Business Background	35
Canyon Action / Cautious Condor	65/45
CD Fun House (350 games)	39
CD Source Book of American History	85
Chess Master 3000/ CD Power (shareware)	35/35
Compton's Family Encyclopedia	49/175
Compton's Interactive Encyc. (WIN)	245
Compton's Multimedia Encyc. (WIN) oem	75
Corel Art Show 3 (Book & CD)	39
DARWIN	75
Desert Storm	29
Dictionary of Living World	45/115
Dinosaur Adventure	49
Discis: Kids Read	
- Cinderella	27
- Heather Hit her First Homerun	27
- Long Hot Day at the Ranch	27
- Moving Gives Me Stomach Ache	27
- Mud Paddle	27
- Paper Bag Princess	27
- Scary Poems for Rotten Kids	27
- Tale of Benjamin Bunny	27
- Tale of Peter Rabit	27
- Thomas Swimsuit	27
Dr.T's Composer Quest	59
Educational Gameland (K- 6 grade)	32
Electronic Home Library/Elec. Library of Art	45/39
Essential Home & Business Collection	39
Family Choice	29
Family Education Collection	29
Golden Immortal / Grammy Awards	39/45
Great Wonders of the World	55
Great Literature (2000 books)	75
Greatest Books Collection	39
Grolier's New Multimedia Encyc. WIN 1.5	85/225
Guinness Disc of Record	35
Hound of the Baskervilles	37
Information USA Government	65
JAZZ of Mutimedia History	69
Jones in the Fast Lane	29
Just Fonts / Just Grandma & Me	39/39
King Quest V	29
Kodak Photo CD Access	35
Languages of the World	29
Laser Printer Companion	39
Learn to Speak Spanish / Loom	69/37
Macromedia Action WIN	35
MacMillan Dictionary for Children (K-12 grade)	45
Mavis Beacon Teaches Typing / Mammals	39/39
Microsoft CINEMANIA	55
Microsoft ENCARTA	255
Microsoft Multimedia Beethoven 9th Symphony	55
Microsoft Multimedia Bookshelf/ w. box	55/125
Microsoft Musical Instruments	55
Mixed-up Mother Goose/ w. box	29/45
Monkey Island	29
Monster Disk II (2 shareware disk)	55
MPC Wizard (test & tune-up for WIN)	15
Multimedia Animals Encyclopedia	59
Murder Makes Stranger Dead Fellows	49
Nautilus BacPac (6 disk)	55
New Basics Electronic Cookbook	45
Old Testiment	59
Oxford English Reference Library	99
Pacific Islands / Publish It	39/49
Peter & the Wolf	35
PC SIG Library vol.11 / PC SIG Games	99/34
PC Karaoke w. Microphone	95
Phoenix Shareware v2.0 / v3.0 (new)	35/49
Pilgram Quest	75
Playing w. Lang. (Eng/Fren/Ger/Jap/Span)	39/49
Pro Phone (3 disk) 93 / (7 disk) 93	99/269
Prescription Drugs / Q & A v4.0	59/49
Reference Library	39
Secret Weapons of the Luftwaffe	35
Shareware Gold II	57
Sherlock Holmes I / II	39/49
Sleeping Beauty / Stellar 7	35/29
Space Quest IV - Roger Wilgo / w. box	35/49
Stories of Murder, Mystery, Magic, Terror	39
Street Atlas (DeLORME)	115
Talking Schoolhouse / The Animals	65/29
The Adventure of Willy Beamish	29
The Family Doctor / w.box	45/55
The World of US Manga	45
Time Table of History	35
The USA Factbook	37
Ultimate Shareware	45
US History / US Atlas w. Auto Map	49/35
Voyage to the Planets 1 / 2 / 3 / 4	55
Where in the World is Carmen Sandiego	45/65
Who Kill Sam Rupert	29
Wing Commander w. Secret Mission 1&2	55
Wing Commander w. Ultima 6	39
World Vista / World Atlas	49/9

CASES

Baby AT w. 200W Power	79
Baby Tower w. 200W Power	85
Mid Tower w. 220W Power	105
Mid Tower w. 250W Power: Black/ White	145/135
Full Tower w. 250W Power	139
Full Tower w. 300W Power: Black/ White	215/199
Slim w. 200W (2 drive bay)	95
WorkStation w. 60W (1 drive bay)	95
Hard Disk Drive External Casing	
- 1 half ht or SCSI for Mac, 40W, w. Int cable	99
- 2 half ht or 1 full ht for PC, 60W	119
- 3 half ht or 1 full & 1 half ht for PC, 60W	139
- 2 half ht or 1 full ht for SCSI for Mac, 60W	139

CONTROLLERS

4 Floppies w. IDE controller for AT	45
COREL SCSI s/w / w. 8bit controller	75/99
IDE w. I/O for VLB	69
ACCULOGIC	
sIDE-2 (2 IDE HD only)	26
sIDE-3 (2 FD & 2 IDE HD)	29
sIDE-4 (2 FD & 2 IDE HD, 2S & 1P)	49
ADAPTEC	
1522K SCSI w. Kit (3MB/s)	159
1542C SCSI w. Kit (10MB/s)	259
1542C Plus w. ASW 500	325
1640 SCSI w. Kit for MCA	335
1742A SCSI EISA / w. Kit (2F & 2H)	375/435
ASW-1410 ASPI MS-DOS Manager v3.0	69
ASW-EZ SCSI for DOS & WIN	69
ASW-310 Sy-Tos Plus (tape backup s/w)	99
ALWAY TECHNOLOGY	
AL1000 Pro Corel	189
IN 2000 High Performance 16 bit SCSI	179
IN 2000 Pro Corel	219
AMI	
Fast FastDisk cache SCSI EISA (up to 16MB)	495
DTC	
2290 IDE EISA	139
3280AS SCSI	105
3290AS EISA SCSI host adapter	479
6282 1:1 ESDI	125
7287 1:1 RLL	73
FUTURE DOMAIN SCSI Controller	
TMC 1660 for AT (H only)	139
TMC 1660 DNK for AT (H only) w. Kit	229
TMC 1680 for AT (4F& H,15MB/s)	169
TMC 1680 DNK for AT (4F & H) w. Kit	259
KOUWELL	
4 Floppies controller for XT,AT	33
IDE controller	27
IDE controller w. AT I/O (2S 1P 1G)	34
MICROSOLUTIONS	
CompatiCard IV: 4 Floppies controller (2 ext) 360K/720K/1.2MB/1.44MB/2.88MB FD	89
MYLEX	
DCE 376 EISA SCSI w.4MB cache	725
NCL America (w. on board Bios)	
538B IDE for AT (2HD & 2FD)	45
ORCHID	
VESA LBus IDE (2HD,2FD) w. AT I/O	79
PROMISE Drive Cache Controller	
DC 99M IDE 512K build in, upgrade 8MB	139
DC100M IDE I/O 512K build in,upgrade 8MB	169
DC 200 IDE cache up to 16MB	145
DC 2032 IDE I/O cache up to 16MB	169
DC 2040 SCSI cache up to 16MB	235
DC 4030VL IDE VLB cache up to 16MB	215
ULTRASTOR	
ULT 12F/24 ESDI 32K cache	165
ULT 12C/1 ESDI 1MB cache	455
ULT 22CA ESDI EISA 64K cache	495
ULT 15C IDE 8MB 256K cache	199
ULT 14F ISA SCSI 32K cache	229
ULT 24F SCSI EISA 64K cache	385
ULT 34F VL Bus SCSI-2 32K cache	295

DIGITIZERS

SummaSketch III 12x12, 4 or16 button	299
SummaSketch III 12x18, 4 or16 button	549

DRIVES

Frame for 3.5" Hard Drive and Floppy Drive	6
Removable Hard Drive Case for 3.5" HD	45

HARD DRIVES

CONNER	
CP-30104 120MB 19ms IDE 3.5", 1" ht	185
CP30174E 170MB 18ms IDE 3.5", 1" ht	215
CP-30254 250MB 14ms IDE 64K 1" ht	295
CP-3544 544MB 12ms IDE	865
FUJITSU (5 years warranty by manufacturer)	
2624FA 525MB 12ms SCSI-1&2	815
2266FA 1.2GB 15ms SCSI 5.25" full	1135
M2652S 2.0GB 11ms SCSI 5.25" full	2095
MAXTOR	
MXT 7120A 130MB 15ms IDE 3.5"	195
MXT 7213A 213MB 15ms IDE 3.5", 1" ht	269
LXT 7345A 345MB 13ms IDE 3.5"	455
LXT 535A 535MB 13ms IDE 3.5"	865
LXT 7120S 130MB 15ms SCSI	235
LXT 7213S 200MB 15ms SCSI 3.5"	329
LXT 340S 340MB 13ms SCSI	555
LXT 535S 535MB 13ms SCSI	895
PO-12 1.2GB 13ms SCSI	1085
PI-17S 1.7GB 13ms SCSI	1415
Optical Drives : Rewritable 1 GB 35ms SCSI Ext Tahiti II / 1 GB Cartridge Glass	2725/199
MICRO SOLUTIONS (External Hard Drive)	
40MB / 100MB (use printer port)	345/455
QUANTUM	
EIS 127AT 127MB 17ms IDE 32K cache	215
EIS 170AT 170MB 17ms IDE	235
LPS-240AT 244MB 16ms IDE 256K cahce	305
LPS-240S 244MB 16ms SCSI 256K cache	325
LPS-525S 525MB 10ms SCSI 512K cache	915
PRO-1225S 1.2GB 9ms SCSI 1.2M cache	1439
TEAC	
SD 3105 105MB 19ms IDE 1"ht	169

FLOPPY DRIVES

SYQUEST	
SQ44i 44MB Int	289
SQ44e 44MB Ext w. controller & cartridge	499
TEAC (Floppy Drive)	
1.2MB 5.25" / 1.44MB w. frame	55/53
2.8MB 3.5" w. frame	95
Dual Floppy 1.2MB & 1.44MB	139

I/O CARDS

KOUWELL	
2S 1P 1G w.NS16550AFN chipset (XT, AT)	55
4 Serial ports card	79
AT I/O (2S 1P) / AT I/O (2S 1P 1G)	27/27
AT I/O (2S 2P) / AT I/O w. IDE (2S 1P 1G)	33/34
Printer card / Serial card (XT, AT)	15/15
QUICKPATH	
13 port I/O w. 4-16550UARTS (2 IDE, 4F, 4S, 2P, 1G)	115
STB 4-COM	
4 serial, 16 bit, w.16554, support COM 1-8, IRQ 2,3,4,5,10,11,12,15	109

KEYBOARDS

FOCUS	
FK2001 101 click	42
FK8000 111 w. calculator	45
FK9000 129 keys Programmable	72
NORTHGATE OMNI	
101S /101NI / 102	55/69/69
Ultra T or F	95
SIIG (click)	
Suntouch Jr. 84-key Mini	45
Suntouch 101	49
OTHERS	
BTC 84-key Mini	39
KeyCat II 101 w. trackball mouse	75
KEYTRONIC 101	39
MAXI 101 / MITSUMI 101	35/35
PT505C 101	30

MATH CO-PRO, CPU

AMD CPU 386 DX40	85
CYRIX	
83D87 - 25 / 33 / 40	85/85/99
Cx486 DLC	175
INTEL	
Math Co Processor 387 DX	85
Over Drive Processor - 486 SX16 / SX20	395
- 486 SX25 / DX25	495
- 486 SX33 / DX33	659
CPU 386 DX25 / DX33	85
CPU 486 DX33 / DX50	329/459
CPU 486 DX2-50 / DX2-66	439/549
Cooling Fan (heat sink)	22.95

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RAMpAT! up to 16MB(SIMM),16 bit, AT	99
SIMM-ply Ram 8/16 bit, 8MB max, XT, AT	145
SIMM-ply Ram 16 bit, 8MB max, PS/2-50,60	169
SIMM-ply Ram 32 bit, 8MB max, PS/2-70,80	179
INTEL Above Board w. 512K	159

MEMORY CHIPS

DRAM	
1 MB x 1 - 80 ns	3.99
256K - 80 ns / 64K - 100ns	1.39
256K x 4 - 80 ns / 64K x 4 - 80 ns	4.29/1.65
SIMM	
16 MB x 9 - 70 ns	670
4 MB x 9 - 60 / 70 ns	170/150
1 MB x 9 - 60 / 70 ns (3 chips)	36/34
256K x 9 - 70 ns	11
1 MB x 36 - 60 / 70 ns	160/150
4 MB x 36 - 70 ns	580
SIMM Mac : 1 MB x 8 - 80 ns	35
SIMM Mac : 4 MB x 8 - 70 / 80 ns	135/125
SIPP	
1 MB x 9 - 70 ns (3 chips)	35
KINGSTON MEMORY for	
Apple, AST, AT&T, Compaq, IBM, Nec, Sun	call
LASER PRINTER MEMORY UPGRADE	
Jet Ram (3rd Party):	
EPSON - EPL 6000 2MB/ 4MB	129/199
HP Deskjet 500/500C 256K	69
HP Laser Jet IIP+/ III/ IIIP/ IIID	
- 1MB/ 2MB/ 3MB/ 4MB	75/115/155/195
HP Laser Jet II/ IID 1MB/ 2MB/ 4MB	95/135/205
PANASONIC -	
KX-P4410/ 4430 1MB/ 2MB/ 4MB	105/139/215
KX-P4420/ 4450i 1MB/ 2MB/ 4MB	99/139/209
KX-P4450 1MB / KX-P4455 2MB	139/159
ProTracer - 5MB/ 8MB	439/669
QMS P-S 410 1MB/ 2MB/ 4MB	99/139/209
QMS P-S 815/ 825 2MB/ 4MB	159/229
TEXAS INSTRUMENTS - Micro Writer 1MB	69
PACIFIC DATA:	
Pacific 4 Memory for HP IIP+/ IIIP/ III/ IIID	
- 1MB/ 2MB/ 4MB	89/129/209
1-2-4 Plus for HP II/ IID	
- 1MB/ 2MB/ 4MB	115/155/235
Pacific 4 SIMM for HP 4/ IIISi/ XL300	
- 4MB/ 8MB	179/329
Pacific T Memory for Epson 6000	
- 2MB/ 4MB	209/299

MODEMS & FAX

ASAP TF-333 Phone & Fax Auto Switching	89
National Semi TyIN 2000 Answer/Fax modem	195
Micc Global Pocket Fax modem, Tripple 96	159
Adtech Micro Systems (DOS & WIN)	
Data Fax 9624Vi, MNP5	99
Hi - Per 96/144, MNP5	199
E-Tech	
Bullet modem 9696 MNP5 Int/Ext	135/155
Ufomate Pocket Fax modem (w. Win/DOS s/w)	
- P1496MX / P9696MX (special)	265/199
EVEREX	
Evercom 9600 v.42, MNP5 Int	195
FRECOM	
Fax 96 w. 1 Liner & Far Fetch Fax	115
Fax 96 & modem for DOS	99
Fax 96 w. 1L&FFF & modem for DOS	149
HAYES	
Accura 2400 Ext	59
Accura 96 Fax Ext	239
Accura 14.4 Fax Ext	265
Optima 96 v.42, MNP 5 Ext	349
Optima 96 Ext + Fax 96	375
Optima 144 Ext + Fax 144	399
Pocket edition 2400 w. Smartcom EZ	129
Ultra 96 v.42, MNP5 Ext	549
Ultra 144 v.32,v.42, MNP5 Ext	599
V-series SmartModem 9600 v.42, MNP5 Ext	499
Smart Com Exec/ WIN/Smart Com III	75/109/119
INTEL	
14400 EX v.32,v.42,MNP5 Ext	465
Faxability Plus/OCR for WIN trade-up	99
SatisFaxtion modem (w. FAXability s/w)	
- 100 Int send96 rec.48, 2400 modem	95
- 200 Int 96/24 v.42, MNP5	295
- 300 Int 96/144 v.42 (no scan port)	315
- 400 Int 96/144 v.42, MNP5	395
- 400e Ext 96/14.4, 4K data buffer	425
PRACTICAL PERIPHERALS	
PM14.4FX96 Int/ PM14.4FX96SA Ext	225/395
Mini Pocket modem 2400	99
US ROBOTICS	
Courier 144 v.32,v.42, MNP5 Int	375
Courier 144 v.32,v.42, MNP5 Ext	385
Courier 144 w. Fax Ext	399
Courier HST-DS 144 v.32,v.42, MNP5 Ext	725
Sportster 96 modem MNP5 Int/Ext	159/169
Sportster 9696 FAX MNP5 Int/Ext	179/189
Sportster 14.4 MNP5 Int/Ext	179/199
Sportster 14.4/14.4 FAX MNP5 Int/Ext	189/209
Sportster 14.4/14.4 Fax for Mac Ext	235
Shared Access Modem Sharing Kit	675
ZOLTRIX	
2400 baud modem w. MNP5 Int	49
96/24 send & rec. fax/modem w. MNP5 Int	75
96/24 fax/modem v.42, MNP5 Int	105
14.4 fax /14.4 modem Int	229
Pocket send & rec. fax/modem Ext	139
ZOOM	
Send 96 Rec. 48 modem 2400 Int/Ext	79/95
FC9624V Int / FX9624V Ext	99/125
96/96 Fax modem MNP5 Int/Ext	209/239
144/144 Fax modem Int/Ext	225/255
ZY-XEL	
16.8 voice 14.4 Fax w. WINs/w Int/Ext	345/349

MONITORS

9" VGA Mono paper white 640 x 480	135
SIIG	
9" Mono paper white	115
STANDARD TECHNOLOGIES	
400-M VGA 1024x768 Paper white, 110/220v	115
EMC	
EM 1412 14" Mono amber, 90-260v	95
EM 1428 14" 1024x768 .28, 90-260v	279
EM 1430 14" 1024x768 .28 NI, 90-260v	315
EM 1439 14" 1024x768 .39	235
IBM PS/Value Point	
6312 14" 1024x768 .28, NI	399
6314 14" .28, NI w. Digital Pro Control	515
6319 15" Flat 1024x768 .28, NI	639
MAG (Auto Switch Power Supply)	
PMV1448 14" 1024x768 .28, NI	365
MX14S 14" 1280x1024 .26, Sony Trinitron	525
MX15F 15" Flat 1280x1024 .28, NI, MacII	585
MX17F 17" Flat 1280x1024 .26, NI, MacII	1075
Mac Adapter	25
MITSUBISHI	
HL6955SETK 20" 1280x1024 .31, NI	1745
Diamond Pro(TFS 6705) 17" 1280x1024	
.26, NI,Trinitron, MacII, 100-240v	1095
BNC Cable	39
NANAO (100-240v)	
F340iW 15" Full Flat screen,1024x768 .28	735
T560i 17" 1280x1024 .25, NI, MacII	1745
F550i 17" 1280x1024 .28, NI, Mac	1095
T660i 20" 1280x1024 .31, NI, Trin. , MacII	2595
F750i 21" 1280x1024 .31, NI, MacII	2095
MacII cable adapter	69
NEC (120v)	
3FGX 15" 1024x768 .28, Mac	589
4FG 15" Flat 1024x768 .28, NI, Mac	739
5FG 17" Flat 1280x1024 .28, NI, Mac	1345
6FG 21" Flat 1280x1024 .28, Mac	2395
NEC Monitor Lens (Anti-reflection, Anti-static)	
- for 4FG / 5FG / 6FG	74/115/185
FG / MacII cable adapter kit	19.50
PANASONIC (90-140v)	
C1381i 14" SVGA 1024x768 .28, Int, MacII	325
C1395 14" 1024x768 .28, NI, MacII	435
C1991 20" 1024x768 .31, NI, MacII	1455
POWER II	
3E 14" SVGA 1024x768 .28, Int, 90-264v	285
SAMSUNG	
CSD5577 15" Flat 1024x768 .28,NI	479
CSF7487 17" 1280x1024 .26, NI, 90/264v	955
SEIKO (90-132v)	
CM1450 14" 1024x768 .25, NI	425
CM2050 20" 1024x768 .31, NI, Mac	1495
SONY	
1430S 14" 1024x768 .25, NI, 120v	599
1604S 17" 1024x768 .25, NI, 100-240v	995
2036S 20" 1280x1024 .30, NI, MacII	2095
2083S 20" 1280x1024 .30, NI	2295
VIEWSONIC	
4e 14" 1024x768 .28, Int,110/220v	305
5+ 14" 1024x768 .25, NI, MacII	495
5e 14" 1024x768 .28, NI, MacII	395
6e 14" 1024x768 .28, NI	345
6FS 15" 1024x768 .28, NI,90/264v	535
15 15" 1280x1024 .28, NI, Mac II	645
7 17" 1280x1024 .28, NI, MacII	995
17 17" 1280x1024 .28, NI, Mac II	1245
8 20" 1280x1024 .31, NI, MacII	1595
20 20" 1600x1280 .28, NI, Mac II	1895
Mac cable adapter	35

MOTHERBOARDS

386-33/386-40 w. 128K cache (no cpu)	125/129
486-33 w. 64K / w. 128K (no cpu)	135/149
AMI	
Mark V 386-33 w. 64K	395
Super Voyager 486-33 256K VLB	875
Super Voyager 486-50 256K VLB	1095
Super Voyager 486 DX2-66 VLB	1245
Enterprise II 486-50 EISA 128K	1145
Enterprise III 486-33 256K VLB EISA	995
Enterprise III 486-50 256K VLB EISA	1195
Enterprise III 486 DX2-66 256K VLB EISA	1345
MICRONICS	
386SX-20 Phoenix BIOS (32MB max)	175
386SX-25	235
386-33 64K cache Gemini (32MB max)	355
486-33 256K cache ISA Gemini	685
486-50 256K cache ISA / EISA E2	995/1295
486-33 Local Bus w. 256K cache	795
486-DX2-50 Local Bus w. 256K cache	955
486-DX2-66 Local Bus w. 256K cache	1175
MiniBoard 486-33 256K cache ISA	645
MiniBoard 486-50 256K cache ISA	995
MiniBoard 486-DX2-50 256K ISA	885
MiniBoard 486-DX2-66 256K ISA	945
MiniBoard 486-DX33 256K EISA E3	895
MiniBoard 486-DX2-66 256K EISA E3	1195
4MB Piggy Back (up to 8MB)	299
16MB Memory Card	150
NICE (w/o cpu)	
486-33 / DX2-66 256K VLB	255
486-50 / DX2-66 256K Mini EISA VLB	355
486-50 / DX2-66 256K EISA VLB	495
ORCHID (no cpu)	
Superboard 486 (VLB for VGA & controller)	
- DX33/ DX50/ DX2-66 256K	295/325/295
QUICK-PATH	
486-50 w. 64K cache, 15ns ISA (no cpu)	325

MOUSE

JOYSTICK : Warrior 5, Quick shot	14.50
AGILER	
AGM-600E Serial 400 dpi	26.50
ATB-610 Serial Trackball	29.50
Keen mouse	12.50
APPOINT (special)	
MousePen Pro / Thumbelina (portable)	49
GENIUS	
GM-F302 mouse (3 button)	29
IMSI	
PC Stylus (Mouse & Trackball for CAD)	35
KENSINGTON	
Expert serial & trackball/ Bus mouse	99/115
LOGITECH	
Cordless /Dexxa Serial /First Serial	89/27/37
Fotoman Digital Camera for PC & PS/2	485
Mouseman Bus / Serial	64/59
Scanman 256 / w. OCR software	249/285
Scanman color - 16.8 million colors	545
Trackman Portable / Trackman Combo	99/75
MICROSOFT	
Ball Point (portable)	119
Bus 400PPI / Serial 400PPI	85/59
Bus 2.0	89
Serial 2.0 w. PS/2 port	79
Serial 2.0 w. 9 to 25 pin adapter	79
MOUSE SYSTEMS	
Omni (2 button)	25
PC III Serial (optical) / Mouse Pad	59/22
PC Trackball II	55
Pen Mate / Page Brush - color scanner	155/399
Serial Bus Card (9 IRQs)	29
The New Mouse 400CPI (3 button)	55
The White Mouse w. Power Panel	39

NETWORK

Dyna DL 2000 card	215
MAILMAN 2.0 (10-user for Novell NetWare)	199
SilverNet Software / Starter Kit	79/425
3COM	
3C503 8 bit coax / TP ethernet	179/199
3C503-16 16 bit coax / TP Etherlink II	169/179
3C507 16 bit coax ethernet / 5 pack	279/1250
3C507-TP 16 bit TP ethernet / 5 pack	299/1450
3C509 Etherlink III coax / 5 pack	139/625
3C509 Etherlink III TP / 5 pack	145/650
3C579 Etherlink III EISA coax / TP	245/249
3C523B Etherlink/ MC for PS/2/ 5 pack	289/1210
3C523B-TP TP for PS/2 / 5 pack	319/1435
3C621 Link Builder 10 BT (12 port)	745
3C623 Single port BNC Module	125
TokenLink III 16/4 ISA/ MCA/ EISA	465/495/699
ARTISOFT (Lantastic)	
- FREE UPGRADE to 5.0	
AE-2 Ethernet starter Kit v5.0,10Mbps	459
AE-2 Ethernet starter Kit WIN	520
AE-2 Ethernet adapter / for MCA	199/275
AE-3 Ethernet starter kitv4.1,10Mbps.	499
AE-3 Ethernet starter kit v4.1, WIN	535
AE-3 Ethernet adapter	235
2Mbps adapter	145
AE-1/T 8bit 10Base-T adapter	135
AE-2/T 16bit 10Base-T adapter	210
64K RAM upgrade for AE-2, AE-3 adapter	45
AI software (individual node) v4.1	69
AI software v5.0 DOS / WIN	79/89
Articom (LAN modem sharing s/w)	239
Artiscribe System s/w / HW + s/w Kit	299/345
Central Station Connectivity Processor 5.0	399
Dial Up Connection	69
Ethernet software Kit v5.0 DOS	79
Lantastic Z (2 stations) v4.1	89
Lantastic for Netware (Network O/S)	139
Lantastic for WIN software Kit	165
Lantastic for Mac s/w Kit / HW + s/w Kit	339/549
Lantastic Print Server Station Ware	69
Netware Print Server Station Ware	69
Network Eye (Remote Control Access)	129
Peer-Hub 10Base-T concentrator	270
Peer-Hub AUI Interface Kit	270
Remote Boot ROM for AE-2, AE-3 adapter	45
Sounding Board adapter Kit	72
CASTELLE	
FaxPress (Network Fax Server)	
- Novell 1 line Ethernet coax	2595
- Novell 2 lines Token Ring 16/4Mbps	3225
JetPress (Network Print Server)	
- for HP II,IID,III,IIID, coax / TP	429
LANPress (Print Server) connects up to 4 printers	
- Ethernet Thick/Thin coax (1P 3S)	475
- Ethernet Thick/Thin coax (2P 2S)	625
- Ethernet 10BaseT (1P 3S) / (2S 2P)	475/635
CC:MAIL	
cc:Mail DOS v4.0 / WIN platform	199/339
cc:Mail 10-user / 25-user pack	239/579
cc:Mail Gateway v3.21 / FAX v1.2	879/1350
COMPULAN	
Ethernet	
- 8 bit E100 coax (special)	69
- 8 bit ET500 TP	75
- 16 bit E200 coax	89
- 16 bit E210 coax & TP, BUS master	159
- 16 bit E300 coax dual-port shared mem.	129
- 16 bit ET600 TP	95
- 16 bit E650 coax & TP, surface mount.	125
- 16 bit E200/2 coax for PS/2 MCA	145
- 16 bit E800/2 TP for PS/2 MCA	155
- 32 bit E911 Bus Master for EISA	315
- 32 bit E950 coax & TP, EISA Bus	259
- Boot Prom (for E100/ E200/ E300/ E600)	25
- Hub 8 port TP +1BNC +1 cascading	285
- 12 port TP +1BNC +1 AUI +1 cascading	495
- Pocket adapter for coax / TP	179
Arcnet	
- 16 bit for XT/AT Star Topology	69
- 16 bit for XT/AT Bus / TP	79/79
- 16 bit "4-in-1" Turbo Star & Bus	
(w. NCR 90C98A ASIC)	99
- 4-port Arcnet Passive Hub	19
- 8-port Coax Stackable Active Hub	159
FARALLON	
PN381 PhoneNet w.Timbuktu for WIN	259
GATEWAY COMMUNICATION	
G/Ethernet 16 coax / 32 bit	99/350
INTEL	
EtherExpress Flash LAN Adapter (combo)	155
EtherExpress 16 coax/16 TP/5 pack	135/139/545
EtherExpress 16 MCA / 16 MCA TP	179/189
EtherExpress 32 EISA	439
12 port Hub EtherExpress ISA Adapter	565
12 port Hub EtherExpress EISA Adapter	645
LAN Protect 1.5 (virus protection)	685
LAN Sight 3.0 Netware Utility / Monitor	299
LANSpool s/w 386 NLM v3.5.8	425
NetPort II Thin /Thick Ethernet	519
NetPort II 10BaseT / Token Ring	529/759
NetSatisfaxtion V.2 (s/w for NOVELL)	955
RJ45 Harmonica	55
TokenExpress 16/4 ISA/ EISA/ MCA	535/685/535
NOVELL	
NE1000 coax ethernet (special)	99
NE2000 plus coax ethernet / 5 pack	145/625
NE2000-TP plus TP ethernet / 5 pack	139/599
NE2000 Netware Lite starter kit	395
NE3200 Eagle coax EISA	675
NE3200 EXOS coax EISA	625
NTR 2000 Token Ring	435
Eagle NE10T 4 Port Hublet	225
EPROM for NE2000	35
EXOS NE10T-Hub, 8 Port (8 TP + 1 coax)	335
Netware Lite 1.1 + DR DOS 6.0	69
Netware 2.2	
- 5 / 10 / 50 / 100-user	489/1089/1995/2955
Netware 3.11	
- 5 / 10 / 20-user	599/1345/1885
- 50 / 100 / 250-user	2650/3859/6885
Netware 4.0	
- 5 / 10 / 25-user	935/2095/2895
- 50 / 100 / 250-user	3925/5495/9695
SMC (Western Digital)	
Ethercard Plus Elite 8 bit coax	115
Ethernet Plus Elite 16 coax / 16 TP	139/145
Ethernet Plus Elite 6 pack 16 coax/16 TP	725/750
3016 16bit coax / 16bit TP	145/149
Ethercard Elite 16 combo (coax/10 BaseT)	175
Ethercard Plus/ A for MCA / TP	219
Ethernet Elite 32 bit coax / TP	650/660
Netware Boot ROM for ethernet	34
8 Port Concentrator (8TP+1AUI)	339
12 Port Concentrator(12TP+2AUI+1BNC)	595
Token Ring 16/4 ISA / MCA	379
XIRCOM	
PE2-10B2 Pocket Adapter ethernet coax	315
PE3-10B2 / PE3-10BT	295/299
CABLES & ACCESSORIES	
Twisted pair cable, TP 4-pair, PVC, Level 3	
- 1000' / 500' / 200'	89/55/35
10 BASE-T cable, 1000' Level 3 plenum	165
RG58 cable, 1000'	109
Belden 8259, RG58, 1000'	165
Transceiver AUI ---> TP (coax to RJ45)	69
Transceiver AUI ---> BNC (thick to thin coax)	69

POWER SUPPLIES

AMERICAN POWER CONVERSION (UPS)	
APC-400 Smart-UPS (286, 386 WS)	309
APC-600 Smart-UPS (386, 486 FS)	399
APC-900 Smart-UPS (386, 486, FS & WS)	639
APC-1250 Smart-UPS (multiple FS & WS)	799
APC-450 Back-UPS 286, ps/2, 386	235
APC-600 Back-UPS 286, 386 FS	285
APC-800 Back-UPS 800RT, 2-4ms, 15 mins	565
APC-750 On-Line UPS (286, 386, 486 FS)	1365
APC-1500 On-Line UPS (multiple servers)	2499
APC PowerChute Plus for Novell or UNIX	79
APC UPS Monitoring Board for NetWare	69
Power Doctor (DOS) I/F Kit for Smart-UPS	79
GENERAL	
200W for XT / UL	48

250W for Baby AT/ Baby or Mid Tower	48
250W for AT	48
230W / 300W for Full Tower	55/79
550W / 1200W for UPS	279/659

PC POWER COOLING

Standard 220 desktop / full tower	85
Silencer 270 - for slim, for baby & mid tower	165
- for AT desktop / full tower	175
Turbo-Cool 300 - for slim	165
- for desktop / full tower	185
Turbo-Cool 450 desktop / full tower	345
InnerSource 2210 UPS for full tower, Int, 95-132v, 220W DC, 100W AC, =550VA Ext UPS	345
Novell Netware Interface	
- for InnerSource 2210 UPS	55

TRIPP LITE

BC 500 Lan (UPS, 350W)	215
BC 900 Lan (UPS, 650W)	365
Omni 450 Lan (UPS 325W + Line Regulation)	295
Omni 600 Lan (UPS 425W + Line Regulation)	385
Omni 900 Lan (UPS 650W + Line Regulation)	545

PRINTERS

CANON

BJ-200	(after rebate 299)/349
BJ-300 desktop	349

CITIZEN

GSX 130 (24 pin)	205
- Color Option for above printers	45
GSX 145 (24 pin, 132 column)	355
- Color Option for GSX 145	65
GSX 230 Fonts & quiet	249
GSX 240 Scalable Fonts & quiet	295
PN48 notebook, 1ppm, 2lb, battery, case	309

MICROTEK

TrueLaser MTP-306 6ppm, 2MB, 35 fonts	1195

HP (HEWLETT PACKARD LaserJet w. toner)

Desk Jet 500 / 500C / 550C	389/499/699
Laser Jet HP IIP+ / HP4 / HP4M	769/1379/1865
Laser Jet HP IIIP / IIID / IIISi	865/2295/3395
HP Accessories:	
- Envelope Feeder for IIID (special)	245
- Optinal 500 sheet Legal Letter A4 for HP4	279
- Envelope Power Feeder 75 sheet for HP4	279
- Lower Cassette w. letter tray IIP,IIIP	149
- Toner for HP II, III	79
- Toner for HP IIP, IIP+, IIIP	66
- Postcript for HP 4	425

LASER MASTER

Win Printer 800 (Postscript)	1095
Win Printer XL600 11x17, 600x660PPI	2395
WinJet 800 Postscript for HP II,IID,III,IIID	475
WinJet 1200 Postscript for HP 4	775

PACIFIC DATA PRODUCTS

ProTracer Inkjet, A to C size output, 360dpi, i960RISC processor, 512K, 45dBA	1125
- Postscript emulation card	375
- HP-GL emulation Card	325
- Sheet Feeder I / II	115/105
- Ink Cartridges	19.50

PANASONIC

1123 /1124i / 1624	199/285/349
- Auto Sheet Feeder for 1124 KX-P36	120
2123 24 pin, 43.5dBA, color capability	239
2124 24 pin, 43.5dBA, color capability	319
2624 24 pin, quiet printer, 46.5 dBA	375
2180 9 pin, 45 dBA, color capability	159
Color upgrade Kit KX-PCK11	49
Single bin cut sheet feeder KX-PT10	95
32K Buffer dot matrix printers KX-P43	65
Serial interface card PS-13	75
4410 Laser, 512K, 5ppm	625
- Corona KX-PCR3	45
- Developer KX-PDP4	105
- Drum KX-PDM4	89
- Extra cassette KX-PKC2	45
- Fuser unit KX-PFS5	105
- Optional second cassette KX-P495	135
- Toner KX-P453	35
- Fonts Card KX-P47x (for Lasers)	95
4430 Laser, 1 MB, 5ppm	885
- Accessories same as 4410	
4420 Accessories	
- Developer KX-PDP2	95
- Drum KX-PDM2	99
- Envelope Tray KX-P431	59
- Legal Tray KX-P425	45
- Ozone Filter KX-PFT2	26
- Toner KX-P451	39
4450 Accessories same as 4450i	
4450i Laser, 11ppm	1095
- Developer KX-PDP1	95
- Drum KX-PDM1	145
- Envelope Tray KX-P430	59
- Legal Tray KX-P420	45
- Ozone Filter KX-PFT1	29
- Toner KX-P450	35
4455 Postscript, 11ppm	1695
- others same as 4450i	

QMS (Adobe Postscript)

QMS-PS 410 4ppm, 2MB, 45 Fonts	1335
- Envelope / Legal / Letter Tray	69/69/69
- Lower Cassette w. Letter Tray	149
- Toner	95

SEIKO

Smart Label Printer Plus(IBM/APPLE)	149
Smart Label Printer Pro	245
Box of Label (2 rolls per box)	10.95

TEXAS INSTRUMENTS

Micro Writer PS17 / PS35 5ppm	935/1195
- Apple Talk Kit	99

Laser Printer Accessories:

COMPUTER PERIPHERAL

Jet Page (for HP II)	195

IQ ENGINEERING

True Type Master Library	29
Super Cart. 2 for HP II, IID, IIP, IIP+, III, IIID	249
Super Cartridge 2 & 2LC	269
Super Cart. 3 Pro+ for HP III, IIID, IIIP, IIISi	249
Super Cart. 3 Creative Collection for III family	249
Desk Jet 500 / Desk Jet Plus Professional	99

PACIFIC DATA

25 in One! (for Deskjet 500)	99
25 in One! III	
- for HP II, IID, IIP, IIP+, III, Microtek	245
Complete Font Library for HP III, IIID, IIIP	255
Font Bank for all HP Laserjet (New)	
stores soft fonts, 0.75MB / 1.5MB	205/269
Headlines Cartridge for HP II, IID, IIP	185
Paicfic Connect XI	
- For HP II, IID, III, IIID :	
-- 5 port 256K / 1MB (4S, 1P)	319/389
-- 10 port 256K / 1MB (10S)	449/519
- For HP 4, IIISI, Paint Jet XL300 :	
-- 7 port 1MB / 4MB (6S, 1P)	449/649
-- 10 port 1MB / 4MB (10S)	519/719
Pacific Page & 2MB (Postscript for HP II)	389
Pacific Page II / XL (Postcript for HP II)	719
Pacific Page P.E.(HP IID,IIP,IIP+,III,IIID,IIIP)	279
Pacific Page P.E. & 2MB	405
Pacific Talk	179
Pacific Page PE XL (HP IIP, IIP+, III, IIID, IIIP)	
Postscript w. 2MB & accelerator board	719
Plotter in a Cartridge (HP II)	225
Plotter in a Cartridge P.E.	
- for HP IID, IIP, IIP+, III, IIID, IIIP	225
PELICAN All type ribbons	visit us

SCANNER

TAMARACK

ArtiScan Flatbed 24bit color 256 gray levels	
- w. Publisher 600/800/1200 dpi	895/1145/1775
- w. Pub. & OCR 600/800/1200 dpi	945/1195/1825
- w. Photostyler 600/800/1200 dpi	995/1245/1875
Slide Scan Kit (transparency, slide, X-ray)	
- 600/ 800/ 1200 dpi	525/525/595

MICROTEK

Scan Maker IIXE w. PhotoStyler	1150

Hand scanners... see **Logitech** in section #14

E-TECH

4256G 256 gray scale (w.OCR)	105(125)
4200C 256/4096 color (w.OCR)	275(299)

TAPE BACKUP

COLORADO

DJ-10 (120MB) QIC-40 w. cable	148
DJ-20 (250MB) QIC-80 w. cable	205
- AB-11 Ext tape port	45
- Cable (2 Floppies & tape back up)	9
- FC-10 Controller	95
- KE-09 Ext Kit w/o controller	75
- TC-15 controller w. data compression	195
- Unix/ Xenix driver for DJ-10, 20	99
Trakker 250MB Ext (printer port)	405
Trakker 120MB Ext (printer port)	355

HILITE (Archive s/w included)

California 250MB, 3.5", 1" ht.	175

IOMEGA

Tape 250MB insider, 3.5", 1"ht.	199

MICRO SOLUTION

120MB / 250MB Ext (printer port)	329/389

SUMMIT

SE250 250MB w. Central Point Backup	205

VGA CARDS

Hauppauge Win/TV-02 (122 channel tuner)	450
- Adapter Cable / S-Video Kit	52/85
Paradise 31X 1MB	169
(All cards 1024x768 except as stated)	
CGA / MGP card (Monographic w. Printer)	29
ET4000 Tseng Lab 1MB / VLB 1MB	99/139
Oak067 Super VGA 512K	52
Oak077 Super VGA 1MB	69
STB Super VGA 1MB	99

AMI

FastView EISA VGA Graphics 1MB	295

ATI

VGA Stereo 512K w. speakers	199
Wonder XL 24 1MB, Hi-color, w. mouse	159
Graphic Ultra 1MB (VRAM) w. mouse	249
Graphics Ultra Plus 2 (DRAM)	339
Graphics Ultra Plus 2 (DRAM) w. mouse	369
Graphics Ultra Pro 2MB (VRAM) ISA	435
Graphics Ultra Pro 2MB (VRAM) VLB	445

DIAMOND

SpeedStar 24X 1MB 16 million color	179
Stealth 1MB (VRAM) w. Sierra Hi-color	215
Stealth 24 1MB (DRAM),16 million color	179
Stealth 24 1MB (DRAM), VLB	189
Stealth Pro (VRAM) 1MB	269
Stealth Pro (VRAM) 2MB	369
Viper VLB P9000 (VRAM) 2MB	475

GENOA

7900 1MB, 16 million color, 24 bit	119

MYLEX

GLE911 1MB, 1280x1024, EISA	399
GXE020B 4MB (DRAM), 1280x1024, 2MB VRAM, TMS34020, Tiga/EISA	1039

NUMBER NINE (TI34020)

#9 GXe 1280 x 1024, 90Hz, S3-928 chip	
- for Level 10 / L11 / L12	399/559/699
GXI Lite L20 TIGA,WIN, 1280-16color	565
GXI Lite L21 CAD, WIN, 1280-16color	725
GXI Level 24 CAD, WIN, 1280x1024-256	1279
GXI TC-Level 29, 24 bit 1280x1024-265K color at 72Hz,4MB (VRAM) 1MB (DRAM)	1495

ORCHID

Fahrenheit VA/ VLB, w.voice annotation,24 bit	225
Fahrenheit VLB, VESA 1MB 24bit	185
Fahrenheit 1280 (DRAM) 1MB	169
Fahrenheit P9000 VLB 3MB	459
ProDesigner IIs 1MB, w. Hi-color	159
ProDesigner IIs,1MB, Hi-color for MCA	199

III SOFTWARE

ADOBE (special)

Illustrator 4.0 WIN	359
PhotoShop 2.5 WIN	499
Streamline for WIN	125
Plus Pack for Mac / WIN	99
Type Cartridge 1/ Type Cartridge 2	79
Type Align / Type Manager for WIN 2.5	59/67
Type Set 1/2/3 for WIN	65/65/109
Type Set: Overheads & Slides	75
Type Set: Spreadsheets & Graphs	75

AUTODESK

AutoSketch 3.0 / for WIN	125/179
Generic CADD 6.0	285
Graphic Impact / Instant Artist	95/49
Home Series (Home/Landscape/Kitchen/Deck)	45
Multimedia Explorer	115

BORLAND

Brief 3.1 for DOS & OS/2	99
C++ for OS/2	149
C++ Professional 3.1 for WIN	319
C++ 3.1 for WIN & Application Frameworks	485
dBase IV v2.0 for PC (new)	499
ObjectVision 2.1 / ObjectVision Pro 2.1	102/335
Paradox 4.0 / for WIN (special)	499/125
Quattro Pro WINDOS / WIN/ 4.0 DOS	99
SuperPack (Quattro Pro & Paradox) WIN	195
Screenery (Windows wallpaper, screen saver)	25
The World of C++ (Video Training Kit)	85
Turbo C++ for DOS / WIN	75/105
Turbo C++ Visual Edition for WIN (special)	79
Turbo Debugger & Tools 2.0	99
Turbo Pascal 7.0 / 1.5 for WIN	115/109

CENTRAL POINT

Anti-Virus for DOS / for WINDOS	15/39
PC Tools 8.0 DOS / 1.0 for WIN	115/125

INTUIT

Quicken for DOS 6.0/ WIN 2.0/ MAC 3.0	45
Quicken Companion	17
QuickBook / QuickPay (payroll)	87/39
QuickBook & QuickPay	110

LOTUS

Improv - 12 data dimentions (special)	99
1-2-3 for WIN (special)	299
1-2-3 Rel 3.1+ for DOS / Rel 3.4 single	385
1-2-3 for DOS upgrade	105
Ami Pro 3.0 for WIN/ competitive upgrade	229/99
Lotus Organizer (special)	99
Smart Suite (123 win, Ami,Freelance, ccMail)	450

MICROGRAFX

Designer 3.1	355
Graphics Works for WIN	185
Windows Draw 3.0	99

MICROSOFT

C/C++ 7.0 w. SDK / upgrade	315/135
DOS 3.3 / 4.01 / 5.0 / 6.0 (new)	29/19/45/55
- upgrade to 6.0	49
ACCESS (special)	95
Entertainment Pack for WIN 1/ 2/ 3/ 4	28
Excel 4.0 for WIN / upgrade	299/125
Flight Simulator	39
FORTRAN 5.1 (special)	279(105)
Fox Pro 2.5 single DOS / WIN	315
Fox Pro 2.0 (6 pack) - free upgrade to 2.5	555
Money for WIN 2.0 (special)	49(15)
Multimedia Development Kit (w. CD Rom)	299
Office for WIN 3.0	469
PC Mail Server for DOS & WIN (10-user)	435
Power Point for WIN / upgrade	299/99
Profit for WIN (special)	129(89)
Project 3.0 for WIN / upgrade	419/145
Publisher for WIN	125
Quick Basic Compiler 4.5	129
Quick C for DOS / WIN	69/125
Quick C Compiler w. Quick Assembler	125
Sound System for WIN (w.16 bit Audio card)	199
Sound Bits (Cartoons/ Hollywood/ Musical)	29
Test for WIN	249
True Type Font Pack 1/ Pack 2 (HP printers)	49
Video for WIN (CD & floppy)	129
Visual Basic 2.0 (WIN)	125
Visual Basic Professional Version (WIN)	315
- upgrade	195
Visual C++ (special)	129(99)
Visual C++ Professional (special)	319(249)
- upgrade / competitive upgrade	135/189
Windows 3.1/ Upgrade	65/49
Windows 3.1 Device Driver Development Kit	315
Windows for Workgroups	165
- Workgroups Add on (to WIN 3.1)	69
Windows for Workgroups Add on Starter Kit	325
- Workgroups Add on 1 User Kit	165
Word 5.5 (DOS) / for WIN	207/299
- Word for Windows upgrade	125
Works 3.0 (new) / for WIN	99/125
- Works competitive upgrade (WIN)	79

QUARTERDECK

DesqView 286/ DesqView 386 v2.4	69/125
DesqView / X	165
DesqView / X Network Manager (TCP/IP)	129
Qemm 386 v6.0	59

SYMANTEC

Norton	
- Anti-Virus 2.1 (new)	79
- Desktop 2.2 for WIN	109
- Commander (special) / Utilities 7.0	85/112
On Target for WIN	89
PC Anywhere 4.5 Remote and Host	115
Q & A	239
Time Line 5.0 / Lan Pack / for WIN	445/379/445

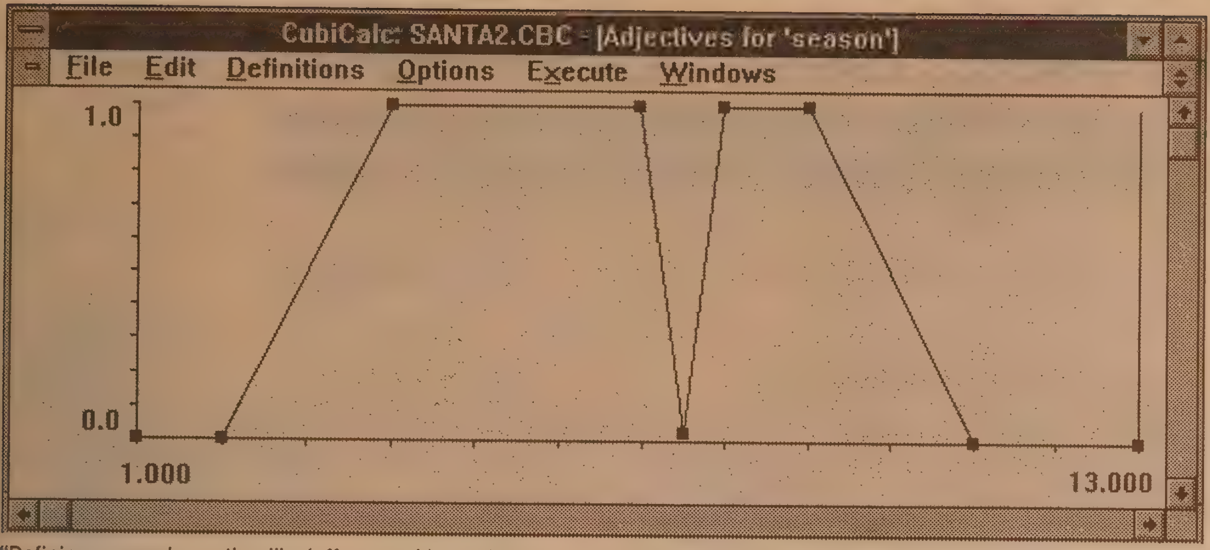
WORDPERFECT

DataPerfect / DrawPerfect	265
LetterPerfect 1.1 / PlanPerfect	95/235
WordPerfect 5.1 (DOS)	259
- upgrade for DOS	79
- competitive trade up 5.1 for DOS	105
WordPerfect 5.2 for WIN	265
- upgrade Kit to 5.2 for WIN	40
- upgrade to WIN 5.2 from DOS	85
- competitive trade up 5.2 for WIN	105
WP Executive/ Office 3.1/ Works	145/95/99
WordPerfect Presentations(w.Sound Blaster)	295

OTHERS

3-D Charts to go	49
ACT ! 2.1 / 2 user / for WIN	225/335/235
After Dark for WIN (screen saver)	27
ALDUS	
- Freehand 3.0 for WIN	379
- PageMaker 4.0 for WIN (free upgrade 5.0)	469
- Persuasion 2.1 for WIN	325
- Photostyler 1.1 for WIN	515
Asymetrix Multimedia Make Your Point	65
Automap (road atlas) / for WIN	49/59
By Design for WIN / Body Works	59/39
Boot Con (solve compatibility problems)	49
CALERA Wordscan 1.1 / plus	182/425
Carbon Copy 6.1 Guest & Host / for Win	112
C - It 3.0 (for C/C++)	99
Clipper 5.2 / upgrade to 5.2	479/115
Check-It	85
Corel Draw 3.0 / upgrade	350/145
- Competitive upgrade (special)	225(175)
Da VINCE eMail 2.0 , 10 user (special)	485(295)
Dash Board for WIN (HP)	45
Direct Access 5.1 / for WIN (new)	59/45
DR DOS 6.0 + NetwareLite 1.1	69
Display Faces	77
Energizer Bunny (screen saver)	19
FaceLift for WordPerfect / for MS WIN	59
Family Bible	25
Fastback Plus 3.1 (special) / for WIN	89/107
Fax Grabbler 1.2	72
Faxit DOS & WIN	69
Fax Master for WIN (special)	79
File Maker Pro 2.0 for WIN (special)	(135)259
Font Minder for WIN	55
Fractal Design Painter 2.0 WIN	255
Frame Maker 3.0 (special)	(299)485
Full Motion Video MATINEE (screen saver)	32
Geoworks Pro	119
Grammatik V for DOS / WIN	57
Hardvard Graphics for WIN (oem)	375(279)
Hardvard Graphics 3.0 for DOS (oem)	399(299)
Hijaak 2.1 / for WIN / Hijaak PS	115/115/199
Hollywood for WIN (special)	199
LapLink Pro v5 / upgrade	109/55
Mac Print / More Fonts	85/77
My Product Invoice	49
OS/2 2.0 / upgrade (IBM)	139/99
Omni Page Professional WIN 2.1	599
PFS: First Choice	79
Pacioli 2000 (special)	15
PC Swimsuit Calendar (DOS screen saver)	29
Power Search (File Manager)	59
Prodigy Starter Kit 3.1	29
Procomm Plus 2.1 / for WIN	69/95
Professional Draw/ competitive upgrade	269/129
QA Plus 4.7 / for WIN	89
Quark X Press 3.1 for WIN	569
Right Writer 5.0 / for WIN	49
Stacker Data Compression 3.0 / upgrade	95/55
Star Trek (WIN Screen saver)	37
SpinRite III / Super PC-Kwik	79/59
Superstor Pro 2X / Superstor 2X	79/59
The Far Side (computer calendar)	15
Time Slip v.5.0	189
Turbo CAD v3.0 (design & drafting)	85
Ventura Publisher 4.1 (new)	499
- Ventura Publisher 3.0 + upgrade 4.0	399
- Ventura Publisher 4.1 Education special	199
Vista Pro / VISIO (shapeware) for WIN	69/195
Wave for WIN / Will Builder	75/15
Winfax Pro 3.0 (new)	85
XEROX Rooms for WIN	64
XTree Gold 2.5 / XTree for WIN 1.5	89/65

Educational Software & Games ... on sal



"Defining a complex notion like 'off-season' by grabbing and moving the curve of a fuzzy adjective in CubiCalc."

continued from page 85

mid-July, is definitely not off-season. The value of the adjective "off-season" for months 11, 12, 1 and the fourteenth of July is zero. Most of months 4 through 8 are definitely off-season, so the value of "off-season" is one. But in months 2, 3, most of 7, 9 and 10, the value of "off-season" is somewhere between zero (false) and one (true). This is certainly an ambiguous definition of "off-season." Can this complex description be handled in a fuzzy system?

Figure two shows Santa's definition as a CubiCalc adjective:

The definition of adjective-curves is one of the nicest touches in this product. In CubiCalc's graphic Windows interface, adjectives are defined by grabbing elastic lines and shaping the response. If you are recording the expertise of an old hand into a fuzzy system, the two of you can just sit there and play with the diagram until you get it right.

When you have defined the variables and the adjectives, you can build rules. Santa's rules for desirable (high-priority) tour stops were:

- **Visits are better if they are off-season**
- **Visits are better if they are nearby**

They are coded into CubiCalc rules in almost the same language:

- **If season is off-season then priority is high;**
- **If season is not off-season then priority is low;**
- **If latitude is nearby then priority is high;**
- **If latitude is not nearby then priority is low**

Once you have variables, rules and adjectives, you have built most of a CubiCalc process.

CubiCalc runs much like a simple computer language, except that at its heart is a "fuzzy engine." When you define the non-fuzzy parts of the system, it is similar to programming in BASIC or Pascal—you format some information, feed it to the engine, and receive the output for storage, charting or export. I chose to receive my output from the fuzzy engine as a table of priorities; CubiCalc could also have made a plot of it, or stored it in a file.

CubiCalc is a working tool, rather than a presentation system. It has no text variables in its language. You must keep track of everything with numerical labels. Such an arrangement would be unacceptable in a presentation product, but it is clear that CubiCalc is designed for behind-the-scenes data acquisition and fuzzy calculation. You will certainly want to present the final results in another package.

It does have Dynamic Data Exchange, so we could use Microsoft Excel or other products to handle more complex input and output for our fuzzy system. CubiCalc's strength is as an easy-to-program fuzzy system.

CubiCalc is an interpreter. Because you can modify the fuzzy relationships and rerun the simulation immediately, without lengthy re-compilation, it is easy to tune a fuzzy system. When you have it just right, it can be encoded into C source with CubiCalc's optional C-generator. The resulting code will call the CubiCalc fuzzy engine as an interpreter. A runtime license is available for distribution of the Dynamic Link Library which includes the fuzzy engine.

CubiCalc also sells a board to import and export data. It is an analog-digital/digital-analog converter, ideal for the machine control problems that fuzzy logic handles so well. Several of the example programs that come with the basic CubiCalc package show how to design for machine control.

CubiCalc has a poor, or rather a tantalizing, manual. It starts to teach you the basics of fuzzy logic and stops part way through. If you already know about fuzzy logic, this is no problem. But if you bought CubiCalc to learn, you will be frustrated just as you begin to get the idea.

LEARNING MORE ABOUT FUZZY LOGIC

Fuzzy logic began in the language of mathematicians, and it has not completed its migration to the vernacular.

An introduction that spans the spectrum from popular to technical is available on videotape from the Institute of Electrical and Electronic Engineers. It was broadcast by satellite (which may explain the distorted audio...) and recorded in December of 1991. It is definitely for corporate purchase, as it costs $720.

For the money, your company gets an opportunity to hear several of the most important names in the field. Masaki Togai of InfraLogic in Japan whets your appetite with videos of incredibly smooth subway operation controlled by fuzzy logic, and cameras that focus on the first try. Lotfi Zadeh of the University of California at Berkeley almost invented the field; he explains the principles. Piero Bonissone did much of the quantification of fuzzy logic; his talk connects the theory with practice. The tapes are expensive, but well worth it for a company that needs a quick, thorough introduction to the field.

Fuzzy logic demands an affection for mathematics. If you have that affection, you will be well served by Bart Kosko's Neural Networks And Fuzzy Systems. It is a thorough overview of the mathematics of fuzzy logic. Particularly valuable are its comparison of fuzzy logic (a calculus of ambiguity) with probability theory (a calculus of uncertainty).

Both fuzzy logic and neural networks are often used for machine control. Kosko compares fuzzy and neural-network solutions to the classic problem of controlling a truck while it backs into a loading dock. He built and ran both kinds of solutions, so his analysis is based on experience. Included with Kosko's book are two disks of DOS software with which you can follow many of his arguments on your own computer.

What we don't have for fuzzy logic is the kind of technically astute but popularly written introduction that Maureen Caudill has given us for Neural Networks in her AI Expert articles (now bound together as Neural Network Primer). While we wait, AI Expert is the best place to watch for applications and comparisons of products.

PROBLEMS AND POTENTIAL

Unlike neural networks, fuzzy logic has been clearly presented in America. Don't let that discourage you: it means opportunity. As technology, fuzzy systems give simple and powerful coding for complex relationships.

Fuzzy logic also teaches an interesting way of thinking. A number of classical logic paradoxes like "This statement is false" yield immediately to a fuzzy approach. You learn to work with truth values that are not "True" nor "False", and are at the same time knowable and calculable. You learn to work in a world with many more colors than black and white. ■

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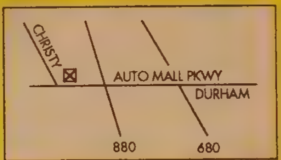

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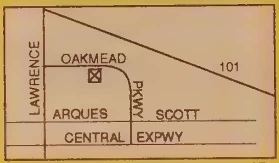

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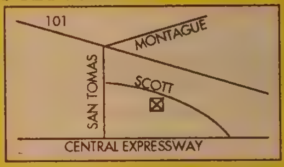

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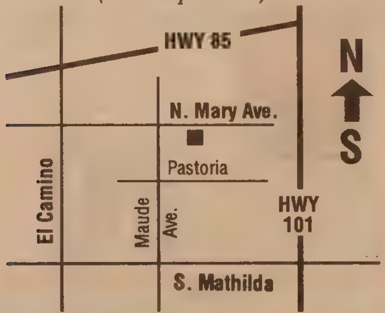

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WORKING ONLINE

EndLink with its TagLink module is a companion program to EndNote. While not telecommunications software, once you are online EndLink connects EndNote to online databases and various resources on the Internet. The TagLink module is used specifically to connect EndNote to Melvyl, the online database and centralized information system containing references to the ten million item holdings of the University of California system, the California State Library at Sacramento library, the Center for Research Libraries, and the library of the California Academy of Science. TagLink is the first commercial product to support the TAGS display bibliographic record format, which was developed by the system-wide UC Division of Library Automation. The Melvyl system can be reached by any computer with dial-up access to the UC computer system. Access to Melvyl is also available to all Internet users. The Melvyl system includes a library catalog database, a periodicals database, article citation databases, and other files. The TagLink module works with the following databases:

- Ten-Year Melvyl Catalog—materials published from 1982–1993
- Full Melvyl Catalog—UC libraries and the California State Library
- Indexes to recent articles (for UC users only; password may be needed)
- MAGS Magazine & Journal—1,000 magazines and journals
- COMP Computer Articles—200 computer-related magazines and journals
- NEWS Newspaper Articles—five major US newspapers
- CC Current Contents—6,500 scholarly journals

The main book catalog on Melvyl can be accessed by anyone with a modem and a computer. Other databases within the system, such as the Current Contents database, require a password that is available to students, staff, and faculty at the University of California. (For information on communication software settings to access the UC Library system phone, call: 510/642-9325.)

> **EndNote and other software programs that can access and organize the large volume of information contained in online databases are bound to attract increasing attention with the continuing growth of online communications.**

SERENDIPITOUS EFFECT WITH ENDNOTE

"Being as EndNote is a relatively new piece of software, people are still discovering uses for it," says Avi Rappoport of Niles and Associates in Berkeley. "One of the things that has happened is that there seems to be a certain serendipitous effect happening to people using a communication's program, an online service, and EndNote and EndLink to access online databases. Researchers have been reporting that as they search for certain bibliographic references for papers they're writing, they'll run keyword computer searches of the online databases and the process will bring them references to articles or data that they were otherwise unaware of."

Another recent development is the expanding of the market for bibliographic record keeping into many fields beyond science and academia, such as writers and researchers, government departments, police, marketing and publicity departments as well as law firms. EndNote and other software programs that can access and organize the large volume of information contained in online databases are bound to attract increasing attention with the continuing growth of online communications. ■

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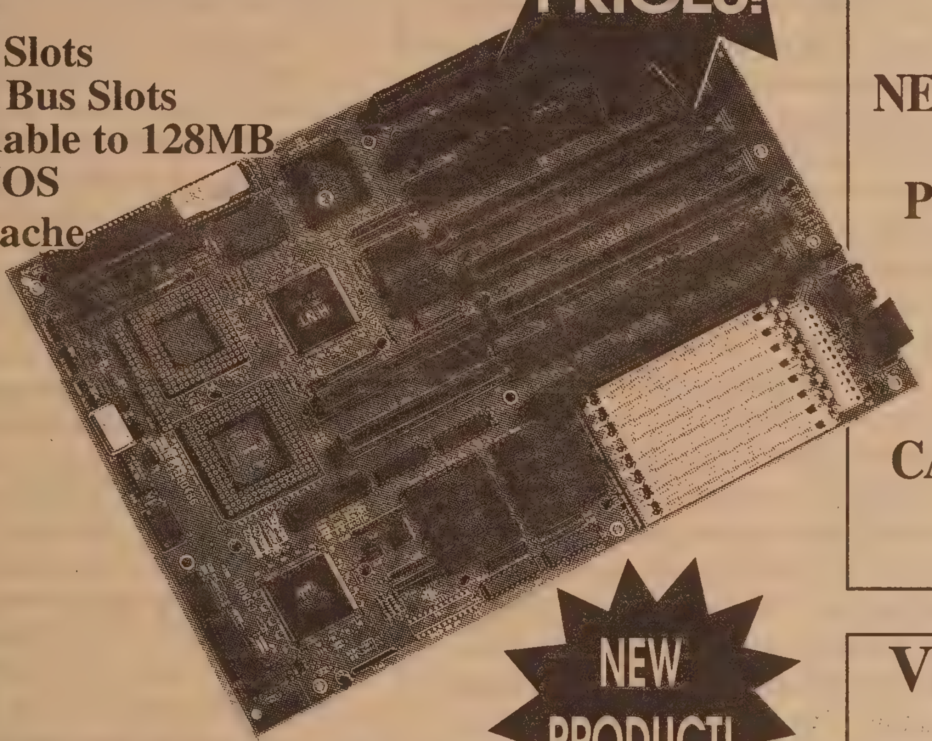

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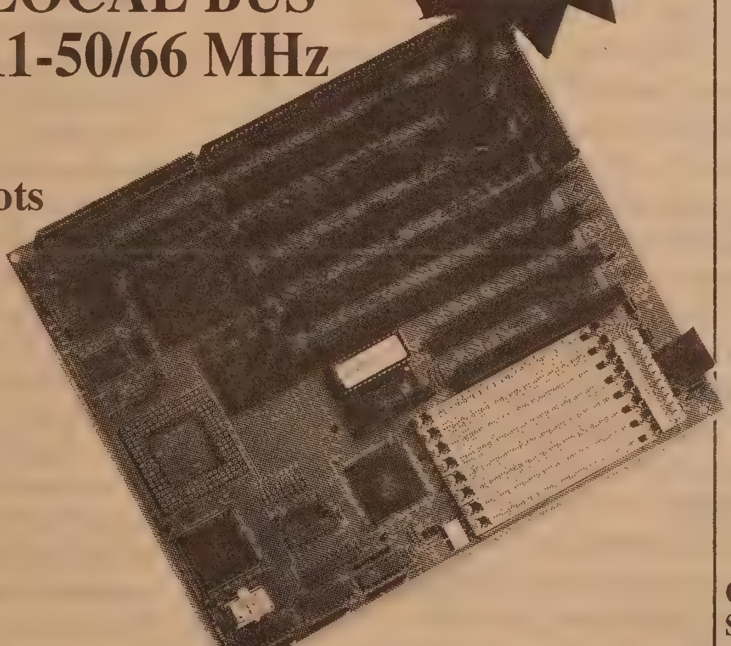

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BY MICHAEL NIEMANN

RESOURCES

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When was the last time your publisher told you that your bibliography was written in an incorrect format? OK, I admit that many, if not most, people who use computers to create text documents probably don't run into that problem. But for the remaining few who have to worry about that, there is now a quick and efficient way to satisfy your publisher without endless rewrites. Pro-Cite for the Macintosh will create any type of bibliography known to publishers and editors anywhere.

The program is a combination database management and text formatting tool which automates the entire process of creating and using references in your writing. The database part of the program uses variable length fields to store bibliographic information according to twenty-six different forms. The 'Book, Short Form' includes fields for Author, Title, Publisher, Place of Publication, Date, ISBN, etc. The other forms vary according to their respective requirement. Each form also has space for notes, an abstract, a descriptor and even the library call number. Each reference is entered into the appropriate form and becomes part of a database. To facilitate input and avoid errors, authority lists containing frequently used information can be used. The database is easily sorted and searched using a variety of search expressions and operators. Those who dread the thought of typing all their references may also import information in a number of ways, including PBS's Biblio-Link software, which is intended to connect to electronic services and download info from DIALOG, BRS, and others.

The text formatting part of Pro-Cite comes into play whenever you need to create a bibliography, a reading list or similar output. Pro-Cite asks you to select the desired records, through a search, for example, and to select a punctuation file. The latter is rather important because there are as many different bibliographic styles as there are editors and publishers. I normally use the Turabian style. Once all the selections are done, Pro-Cite creates the output in exactly the format you specified. Output may be saved to disk in either text, Microsoft Word or MacWrite format, or printed directly. However, the best method to create the bibliography is to let Pro-Cite do it for you. Just create your manuscript so that all references are in the parenthetical format, i.e. (Niemann 1993:23), and Pro-Cite will search the manuscript, match references to its records and select those found for inclusion in the bibliography.

What if your needs don't fit into the pre-defined forms or punctuation files? No problems! Pro-Cite lets you customize almost every aspect of the program. Unfortunately, if you use your references in footnotes, as many journals do, Pro-Cite does not offer as much help since it does not recognize anything but the parenthetical format. It would also be nice if the people at PBS would support additional word-processor formats. As a recent transplant from the DOS world, I use WordPerfect for the Mac and find that I have to convert everything to text format. But that is a little price to pay for the excellent services Pro-Cite offers. Pro-Cite is also available for DOS-based computers and is now network aware, so that many users can access the same database. ■

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Michael Niemann teaches International Relations and Comparative Politics at Trinity College, Hartford, CT. He has been working with computers since 1983 and is particularly interested in the use of computers in higher education.

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continued from page 130

minute rates, like voice messages.

How about broadcast systems? They lie even further into the future and remain too speculative to be of realistic current interest.

MAKING DO: TODAY'S CELLULAR

Meanwhile, how about the technologically-inclined or persons with a clearly defined need for wireless connections who already own a cellular phone and are put off by the high prices for RAM/Ericsson and ARDIS? On principle, they can explore the potential of wireless data transmission by using existing cellular facilities. It is not, however, as simple as plugging a regular Hayes-compatible modem into a cellular phone.

Different makes and models of cellular phones typically have distinctive inner workings. A (rather expensive—almost $300) special adaptor must be inserted to present the illusion of a regular phone jack to the modem while delivering signals to the cellular phone in the specific format it expects.

Furthermore, signals transmitted over cellular systems are interrupted briefly from time to time as the transmission is handed over from the equipment at one cell to the next, usual when communicating from a moving vehicle. It may also take place when transmitting from a single location as the cellular system automatically balances loads among different cells.

During a voice transmission, this may sound like a hiccup. In data transmission, it could chew up dozens of bytes. Furthermore, interruptions like this may cause conventional modems to flash a NO CIRCUIT message, break contact, and sulk.

Equipment and software are available to solve these problems. It simply takes time and determination.

As UPS proved, the clout of a proposed multi-million dollar nationwide contract also helps. If you've received a UPS shipment recently, you may have been presented with an object, studded with control keys, about the size and thickness of a chopping board. You are asked to sign within a small slot to acknowledge receipt.

Back at the UPS truck, the signature and other data are sent by wireless over regular cellular facilities to a mother computer farm at UPS headquarters. This system, the backbone of the UPS system for tracking shipments, has been installed in over 50,000 trucks around the United States.

The UPS example is often cited as proof that wireless technology has arrived. So far, there aren't many other real examples, but that should be taken care of soon, probably in 1994. ■

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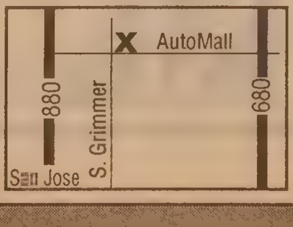

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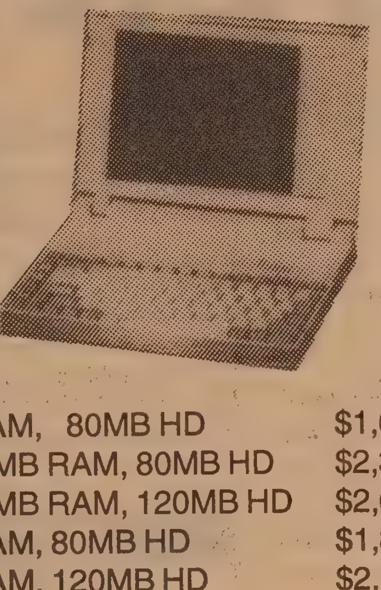

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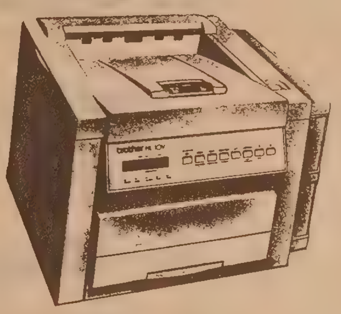

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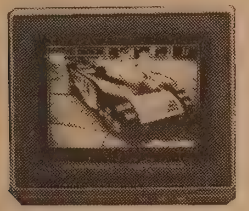

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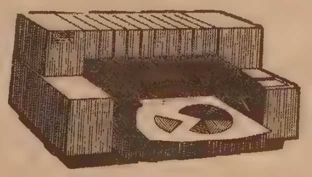

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LQ-870	24 pin	330 cps	459
LQ-1070	24 pin	315 cps	389
Action	**24 pin**	**200 cps**	**209**
LQ-2550	24 pin	400 cps	899
FX-850	9 pin	264 cps	309
FX-1050	9 pin	264 cps	419
EPL-7000	Laser	6 PPM	819
EPL-7500	Laser **PS**	6 PPM	1979
EPL-8000	Laser	10PPM	1349

CD-ROM

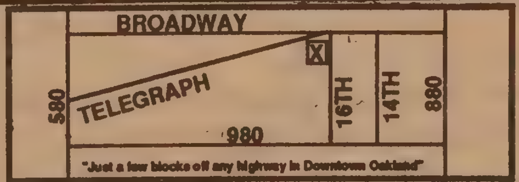
Sony 31A Int CD w/controller........ $229
Sony 31A Int CD Drive w/ controller with soundcard...............................$469
NEC CDR-74/84.............................. Call
Toshiba XM-3401B Int CD Drive..$499

CD-ROM Titles

ITEM #	DESCRIPTION	PRICE
MEC00	MICROSOFT BOOKSHELF	49.99
MEC00	MICROSOFT WORKS MPC	49.99
MEC00	LOTUS 123 V3.1	89.99
MEC00	COMPTONS MPC ENCLY	69.99
MEC00	ANIMALS V1.0	29.99
MEC00	BUS & ECON ATLAS	29.99
MEC00	CARMEN SAN DIEGO	28.99
MEC00	CD STORYTIME DOS	21.99
MEC00	CHESS MASTER 3000 MPC	29.99
MEC01	FAMILY CHOICE	29.99
MEC01	FAMILY DOCTOR	29.99
MEC01	GUINNESS MPC DISK OF REC	29.99
MEC01	JONES IN FAST LANE MPC	26.99
MEC01	KING'S QUEST V	26.99
MEC01	LIBRARY OF FUTUR 1ST	59.99
MEC01	LOOM FROM LUCAS FILM	26.99
MEC01	MARKETING MASTER 1992	21.99
MEC01	MAVIS TEACHES TYPING MPC	29.99
MEC01	MEDIA CLIPS-4 PK	59.99
MEC02	NAT'L GEO MAMMALS	34.99
MEC02	PUBLISH IT 2.0 DOS	34.99
MEC02	SECRET WEAPONS/LUFTWF	34.99
MEC02	SHERLOCK HOLMES	26.99
MEC02	STELLAR 7 DOS	26.99

tore Hours:
-F: 9AM to 6PM
at.:10AM to 2PM

MasterCard
VISA



"Just a few blocks off any highway in Downtown Oakland"

Sales Hotline:
510-763-7631

RESOURCES

Calendar Of Events

CONFERENCES, SHOWS, AND OTHER SPECIAL EVENTS

MAY

May 1 Computer Show & Sale. Cow Palace. Richard James. Call: 1-800-533-7220.

May 2 The Computer Show & Sale. The Centre Concord. MarketPro. Call: (415)388-8893.

May 5 Telecom Developers '93 Conference. Dallas. Parity Software Development Corp. Call: (415)931-8221.

May 8 Computer Show & Sale. Oakland Coliseum. Richard James. Call: 1-800-533-7220.

May 8 The Computer Show & Sale. Marin Civic Center. MarketPro. Call: (415)388-8893.

May 9–12 Foundations For The Future Conference. San Francisco. Association for Systems Management International Conference. Call: David Hanson (415)421-7754.

May 11–13 Blyth Software User Conference. San Jose. Blyth Software. Call: 1-800-767-2336, Priority Code 04ZNXX.

May 15 Communications Japan '93 Exposition. Foothill College. Japanese Cultural Center. Call: (415)949-7302.

May 15 Computer Show & Sale. San Jose. Richard James. Call: (415)340-9113.

May 15 The Computer Show & Sale. Solano Co. Fairgrounds. MarketPro. Call: (415)388-8893.

May 16 The Computer Show & Sale. Centennial Hall, Hayward. MarketPro. Call: (415)388-8893.

May 19–21 Meckler's 4th Annual Virtual Reality '93 Conference & Exhibition. San Jose. Meckler. Call: 1-800-635-5537.

May 22 Computer Show & Sale. San Mateo Expo Center. Richard James. Call: 1-800-533-7220.

May 22 The Computer Show & Sale. Sacramento. MarketPro. Call: (415)388-8893.

May 23 Computer Show & Sale. Alameda Co. Fairgrounds. Richard James. Call: 1-800-533-7220.

May 23 Computer Show & Sale. Pleasanton. Richard James. Call: (415)340-9113.

May 24–26 47th Annual Quality Congress. Boston. ASQC. Call: (414)272-8575.

May 24–28 ESRI's Annual User Conference. Palm Springs. Environmental Systems Research Institute. Call: (714)793-2853.

May 25–27 NeXTWORLD Expo '93. San Francisco. *NeXTWORLD* magazine. Call: 1-800-767-2336.

May 25–27 Silicon Graphics Expo '93. San Jose. PCI Trade Show Management. Call: (512)331-7761.

May 25–28 6th International Software Quality Week '93 Conference: Exploring New Technologies. San Francisco. Software Research Institute. Call: 1-800-942-SOFT.

May 27 Movie Magic: Tools Of The Trade Forum. Exploratorium, San Francisco. YLEM. Call: (415)664-0694.

May 29 The Computer Show & Sale. Sonoma Co. Fairgrounds. MarketPro. Call: (415)388-8893.

May 30 The Computer Show & Sale. Marin Civic Center. MarketPro. Call: (415)388-8893.

JUNE

June 5–6 Computer Show & Sale. San Francisco. Richard James. Call: (415)340-9113.

June 6–9 BG '93 Conference. Pebble Beach. The Burton Group. Call: 1-800-441-5506.

June 8–10 Autodesk Expo '93. Anaheim. Autodesk, Inc. Call: 1-800-451-1196.

June 20–26 The 1st Annual MultiMedia Publisher's Conference. Waikaloa, Hawaii. Unlearning Foundation. Call: Mike Mathiesen, (408)423-8580.

CLASSES, SEMINARS, AND WORKSHOPS

MAY

May 1 Modern Telecommunications In The Information Age Class. San Francisco. SFSU Extended Education. Call: (415)338-1205.

May 1–2 NetWare System Administration Course 2. Oakland. MIS Services. Call: 1-800-300-4MIS.

May 1&8 FrameMaker Course. San Francisco. Media Alliance/Computer Access. Call: (415)771-7133.

May 3 Beginning Excel 4.0 Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

May 3 Intro To FoxPro 2.0 Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

May 3 Intro To Windows Class. San Francisco. SFSU Extended Education. Call: (415)338-1205.

May 3–4 TimeLine For Windows Class. San Francisco. Symantec Professional Services. Call: 1-800-786-8620.

May 4 Intro To WordPerfect Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

May 4–5 LANtastic to Novell Class. Oakland. Excel Micro Solutions. Call: (510)836-2040.

May 5 Intro To Lotus 1-2-3 Class. Walnut Creek. Computer Education Center. Call:

Continued

NETWARE 4.0 FREE SEMINARS

Oakland

MIS, Inc. is offering free seminars on NetWare 4.0. The first, Network Virus Protection, discusses Disaster Planning and Recovery. The other seminar, NetWare 4.0 Directory Services Seminar, explores Seamless Transitions From Workgroup Network to Enterprise Computing. These special courses are offered weekday evenings at the MIS Oakland Training Facility. For reservations, call: 1-800-300-4MIS.

MAY 8, 1993

CALIFORNIA COMPUTER SHOW & SALE

Oakland Coliseum

The California Computer Show & Sale features over one hundred exhibits with millions of dollars in new PC compatibles as well as hardware, software, and accessories. This show also features a seminar on How to Buy, Build or Upgrade Your Computer. Admission is $6 and the show is open from 10 am–4 pm. Call: 1-800-685-1400.

MAY 15, 1993

COMMUNICATIONS JAPAN '93, AN EXPOSITION

Foothill College

Communications Japan '93 features an exhibition of computer software, multimedia products, and books; plus lectures on learning and communication in Japanese using computers, and on cross-cultural issues between Americans and Japanese in the workplace. Japanese Cultural Center, Foothill College, Los Altos Hills. Admission is free and is open from 10:30 am to 4:30 pm. For information, call: Japanese Cultural Center, Foothill College, (415)949-7302.

HSC is Spring Cleaning... That means deals for you!

Now Available...New HSC Catalog!!

Months in the making... our new 48-page catalog listing thousands of electronic essentials! Send $1.00 (or free with order) and thanks for waiting patiently!

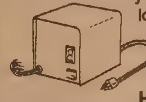
Analog-output Flow Transducer

Now you can have a way to electronically measure the volume of water flowing through a pipe...these clever flow transducers feature a paddle wheel that sends a magnetic pulse with each revolution to a frequency-to-voltage conversion circuit. The greater the volume of water that flows through the 3/4" NPT ports, the higher the DC voltage output. Operates off of 110 VAC. The output is connected to a DC relay, we hope to have a schematic drawn soon with other uses suggested. 2.75" x 3" x 1" body.

HSC# 13939 **$24.95**

Triple Supply, Ready to go!

If you are doing any electronic prototyping or circuit development with a solderless breadboard, this would be a great power supply to use. Since it is a linear design, and not a switching power supply, you can use light loads without worrying about loss of regulation. 5 VDC @ 10 A, ± 12 VDC @ 1 A each. Already in a case with fuse, switch and line cord. Perfect for many digital and Op/Amp projects. 5" x 5" x 7.5"



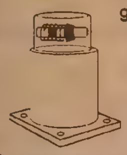
HSC# 13805 **$19.95**

Budget Disk Drive Case/Power Supply

Here is the answer to your expensive disk drive enclosure blues...a large manufacturer bought these units to remove the drives and had leftover cases. What to do? Sell them to you! Plastic case and bracket with beefy linear power supply will work with any half-height 5.25" drive (needs drive power connector, cable exit hole).

HSC# 13850 **$19.95**

Test for Shock -- Industrial Strength!

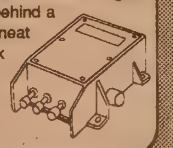


Here is an unusual item...a resettable G-force gauge! This high quality item is used to detect mechanical shocks in excess of 15 G's...perfect for determining if your shipment was dropped by the shipping company, or use to calibrate your rocket sled! Measures 2" tall on a 1 5/8" square base. Detailed data sheet enclosed.

HSC# 13656 **Now 2/$5.95**

Military-Grade Project Box

Nothing's too good for the U.S. Army, right? Wait till you see this high-quality weatherproof box! This unit is some sort of digital display module with a bank of LED digits behind a window, but frankly we're selling this for the neat enclosure! Cast aluminum 6.125" x 1.75" x 3.5" wide (excluding mounting ears), gasketed top, waterproof switch, pot and binding posts. Accepts 2.5" x 4" PC board.



HSC# 13844 **$9.95**

Windows Software Sale!

Customize your Windows environment without going broke! These two programs by Aristosoft will give your computer undreamed-of capabilities! *Wired for Sound* can use your PC speaker or sound board to produce a digitized sound at specified events. (Works with Windows 3.0 only). *More Windows* turns your Windows screen into a larger "virtual" screen, adding up to 300% more area!

Wired for Sound	**HSC# 13769**	**(was $8.95)**	**now $4.95**
More Windows	**HSC# 13770**	**(was $19.95)**	**now $9.95**

Macintosh Serial Cable Set

Three piece set of Mac accessory cables consists of one RJ11 to DB9S cable, one RJ11 to Mini-DIN 8M cable, and one DB9M to DB25F adaptor. Sorry, we don't know what accessories they were intended for, but they appear to be plain, standard cables, and at this price you can afford to stock up and experiment. Both cables are six feet long, are fully shielded and have noise suppressor chokes, and all three items are an attractive off-white color. Large quantity purchase means a special low price!

HSC#13048 **$4.95 ea. or 10/$39.95**

Video Processor on a Budget!

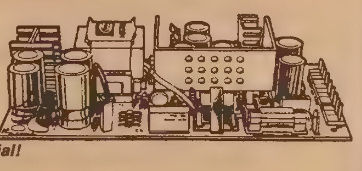
Now you can enhance your video productions without cleaning out your wallet! The Sunburst High Definition Video Processor gives you contol over the quality of your video tape images to correct problems encountered during taping. Four color controls allow you to adjust "sunlight" (brightness), color saturation (really gives life back to washed-out videos), flesh tones and color tint (useful for videos taped with a camera that did not have color balance set). Two other controls let you adjust image resolution and picture sharpness, while a pair of controls let you suspend the processing so you can see the effect of what your are adjusting. Switchable between two different inputs (video only, not RF). Inputs and outputs are RCA jacks. New in box with manual, 90 day warranty. Won't last at this price!

HSC# 13978 **$49.95**

Small Power Supplies, Big Savings!

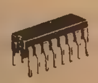
These tiny switching power supplies are small in size only! They are big on performance and value, and the ones with 5 and 12 Volt outputs are perfect for use with 3.5" or smaller hard disk drives. Similar to illustration at right.

A. 2" x 6.25" x 1.25"	Skynet, used, tested good. 110/220VAC input, 5VDC @ 2A, 12VDC @ 1.5A output.	HSC #12758	$17.50 ea	
B. 3" x 5" x 1.5"	Skynet, new. 110/220VAC input, 12VDC @ 2A, -12VDC @ .3A output.	HSC #12378	$19.95 ea	
C. 3" x 5" x 1.5"	Protek, new. 110/220VAC input, 5VDC @ 3A, 12VDC @ 2A, -12VDC @ .3A output.	HSC #13728	$14.95 ea	*Special!*

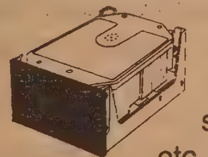


Attention: Manufacturers, Dealers...

WE WANT YOUR PARTS!



Do you have excess electronic inventory to sell? Call Silicon Valley's oldest and most respected "surplus" dealer for a quick quote on your unwanted material! We buy a wide variety of electronic components such as IC's, semiconductors, connectors, passives, etc. We also buy computer items such as disk drives, boards, memory, monitors, etc. as well as tech tools and test equipment. If you have a load you'd like to unload, contact us! Don't trash it, don't scrap it without giving our buyer, Lynn Johnson a call at (408) 732-2412. Turn your dead inventory into live cash!



Recycling Electronics since 1963!

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Toll Free (Orders Only) 1-800-4 HALTED (1-800-442-5833)

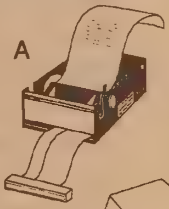
Retail Stores:

3500 Ryder St., Santa Clara, CA 95051 (408)732-1573
4837 Amber Ln., Sacramento, CA 95841 (916)338-2545
6819 Redwood Dr., Cotati, CA 94931 (707)792-2277

Project Potpourri "Two-fer" Sale!

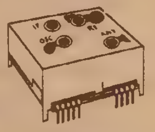
Special prices during May on pairs of the following pieces!

A. **Small Thermal Printer** by Fujitsu, Model FTP-020MCS001. Parallel interface with driver board. Prints 20 columns of 5 x 7 dot characters on 60mm thermal paper. Printer measures 3" x 3.5" x 1.5", driver board has 8155 chip, 8049 chip, print head amplifiers, etc. New in box, sorry, no documentation. Now...special reduced price!
HSC# 13051 **2/ $9.95**

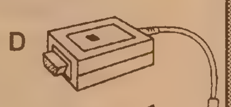


B. **Plastic Project Box** by Amerex. Black textured ABS plastic enclosure is easy to drill or cut with common hand tools. Measures 4.25" x 1.5" x 3.125", uses four #6 self-tap screws (not included). Internal stand-offs make mounting PC board up to 2.75" x 3.25" easy!
HSC #11701 **2/$5.00**

C. **Varactor FM Tuner** by Toko. Model #TMC103A uses 8 - 12VDC, tunes from 88.3 to 108.1 MHz from 75 ohm antenna input, has 10.7 MHz IF output with Vco output for control feedback to tuning circuitry. We provide a schematic of a suggested application showing pinout of this module with related tuning circuit.
HSC #13101 **2/ $4.95 or 10/$20.00**

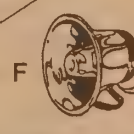


D. **Macintosh peripheral device adaptor** converts older Mac 128 & 512 style peripherals (9-pin D conn.) to the Mac Plus and higher Mini-DIN connector. Requires 15-17 VAC input (use HSC# 12916 16VAC adapter, $3.95 and HSC# 206B 3mm plug, $.59, not included) New low price!
HSC #13001 **2/$5.95**



E. **Impulse Counter** increments each time it gets a 110V pulse. Non-resettable 5-digit unit is only 1" x 3" x .75", has 1100Ω coil.
HSC#11050 **2/$1.99**

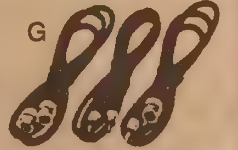
F. **Alarm Siren** by Ungo is deafening! Uses 12VDC. New in box. 4" diameter horn with mounting bracket. Won't last at new low price!
HSC# 13619 **2/$9.95**



G. **Pre-assembled Coaxial Cables** save you time and money!

HSC#	Type	Cable	Imp.	Length	Price
13025	F to F	RG59	75Ω	20"	2/$2.50
13102	F to F	RG59	75Ω	3 ft.	2/$1.50
12536	TNC to TNC	RG59	75Ω	6 ft.	2/$2.50
13137	BNC to BNC	RG58	50Ω	19"	2/$6.95
13140	BNC to RCA	*		4 ft.	2/$13.95

* These are R-G-B+Sync Cables, four color-coded video cables bundled in one sheath.



Terms: Some quantities limited; all items subject to prior sale. **Minimum order: $10.00 plus shipping.** Orders under $20.00 subject to $2.00 handling fee, in addition to shipping. All orders shipped FOB Santa Clara, CA (this means you pay freight!) by UPS Surface (no P.O. Boxes) unless otherwise specified, in which case prevailing carrier rate plus $5.00 handling fee applies. Prepaid orders that don't include shipping charges will be shipped freight COD. There is a $4.00 UPS charge added to shipping charges for COD shipments. If you have questions about your order, please call Customer Service at (408) 732-1854 M-F 9AM to 5PM PST.

Calendar Of Events continued

(510)937-2566.

May 5 UNIX System V Administration Course. Oakland. MIS Services. Call: (510)208-5700.

May 6 Intro To Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

May 6 LAN Workplace—TCP/IP Class. Oakland. MIS Services. Call: (510)208-5700.

May 6 PageMaker 4.0 Intro Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

May 7 Beginning 1-2-3 For Windows Class. San Francisco. New Horizons. Call: 1-800-999-9654.

May 7 Beginning Paradox Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

May 7 Intro To DOS Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

May 8 Beginners Windows 3.1 Course. Emeryville. Informational Data Networks. Call: 1-800-696-5267.

May 10 Advanced Time Line 5.0 Class. San Francisco. Symantec Professional Services. Call: 1-800-786-8620.

May 10 Intermediate Windows 3.1 Class. San Francisco. New Horizons Call: 1-800-999-9654.

May 10 Intro To WordPerfect For Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

May 11 Advanced WordPerfect 5.1 Class. Walnut Creek. New Horizons. Call: 1-800-999-9654.

May 11 Aldus Persuasion For Windows Class. San Francisco. Abacus Training. Call: (415)974-7200.

May 11 Beginning Paradox For Windows Class. San Francisco. New Horizons. Call: 1-800-999-9654.

May 11 Intro To Excel For Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

May 11–12 NetWare For Macintosh Connectivity Class. San Francisco. Abacus Training. Call: (415)974-7200.

May 11–13 Design For Multimedia And Computer/Human Interface Class. Santa Clara. UC Santa Cruz Extension. Call: (408)748-7375.

May 12 Beginning PowerPoint Class. Walnut Creek. New Horizons. Call: 1-800-999-9654.

May 12 Intermediate FoxPro 2.0 Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

May 12 Intro To Word For Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

May 12 LAN Fundamentals Class. San Francisco. Abacus Training. Call: (415)974-7200.

May 12 Microsoft Access 1.0, Level 1 Class. San Francisco. Abacus Training. Call: (415)974-7200.

May 12 Word For Windows (Tips, Tricks & Shortcuts) Class. San Francisco. New Horizons. Call: 1-800-999-9654.

May 12–13 Beginning QuarkXPress Class. San Francisco. New Horizons. Call: 1-800-999-9654.

May 12–13 LANtastic To Novell Class. Oakland. Excel Micro Solutions. Call: (510)836-2040.

May 12&14 Novell System Supervisor 3.11 Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

May 13 Intro To Paradox Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

May 13 MacDraw Pro Class. San Francisco. New Horizons. Call: 1-800-999-9654.

May 13–14 Networking Technologies Class. San Jose. Abacus Training. Call: (415)974-7200.

May 13–14 Q&A 4.0 Class. San Francisco. Symantec Professional Services. Call: 1-800-786-8620.

May 14 Beginning Paradox For DOS Class. San Francisco. New Horizons. Call: 1-800-999-9654.

May 14 Intro To Computers Class. Walnut Creek. New Horizons. Call: 1-800-999-9654.

May 14 PageMaker I Course. San Francisco. Media Alliance/Computer Access. Call: (415)771-7133.

May 14 System Administrator 3.11 Class. Emeryville. Informational Data Networks. Call: 1-800-696-5267.

May 14 WordPerfect Desktop Publishing Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

May 15&22 Photoshop Intensive Course. San Francisco. Media Alliance/Computer Access. Call: (415)771-7133.

May 16 MacroMind Director Course. San Francisco. Media Alliance/Computer Access. Call: (415)771-7133.

May 17 Beginning dBASE IV Class. Walnut Creek. New Horizons. Call: 1-800-999-9654.

May 17 Beginning Quattro Pro For Windows Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

May 17 Freelance For Windows Class. Walnut Creek. New Horizons. Call: 1-800-999-9654.

May 17 Intermediate Paradox Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

May 17 Intermediate Word Class. Walnut Creek. New Horizons. Call: 1-800-999-9654.

May 17–19 Time Line 5.0 For DOS Class. San Francisco. Symantec Professional Services. Call: 1-800-786-8620.

May 18 Beginning Illustrator Class. Walnut Creek. New Horizons. Call: 1-800-999-9654.

May 18 Beginning Quattro Pro Class. Walnut Creek. New Horizons. Call: 1-800-999-9654.

May 18 Intro To Macintosh Networks Class. San Jose. Abacus Training. Call: (415)974-7200.

May 18 Intro To WordPerfect Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

May 18–19 Internetworking With NetWare Seminar. San Jose. Center for Advanced Professional Development. Call: (714)261-0240.

May 18–19 PC Repair Class. Oakland. Excel Micro Solutions. Call: (510)836-2040.

May 19 Beginning DeltaGraph Professional Class. San Francisco. New Horizons. Call: 1-800-999-9654.

May 19 Beginning DOS Class. Walnut Creek. New Horizons. Call: 1-800-999-9654.

May 19 Beginning Excel Class. San Francisco. New Horizons. Call: 1-800-999-9654.

May 19 cc:Mail Class. Walnut Creek. New Horizons. Call: 1-800-999-9654.

May 19 Intermediate Paradox Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

May 19 Intermediate WordPerfect For Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

May 19 Intro To The Macintosh Class. Walnut Creek. New Horizons. Call: 1-800-999-9654.

May 19–20 CorelDraw v3.0 Class. San Francisco. Abacus Training. Call: (415)974-7200.

May 20 Beginning Delta Graph Professional Class. San Francisco. New Horizons. Call: 1-800-999-9654.

May 20 Beginning Excel Class. Walnut Creek. New Horizons. Call: 1-800-999-9654.

May 20 FileMaker Pro I Course. San Francisco. Media Alliance/Computer Access. Call: (415)771-7133.

May 20 Intermediate Excel Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

May 20 Intermediate Excel 4.0 Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

May 20–21 Optimizing NetWare Seminar. San Jose. Center for Advanced Professional Development. Call: (714)261-0240.

May 21 Beginning FileMaker Pro Class. San Francisco. New Horizons. Call: 1-800-999-9654.

May 21 Beginning Word Class. Walnut Creek. New Horizons. Call: 1-800-999-9654.

May 21 Macintosh Network Administration Class. San Francisco. Abacus Training. Call: (415)974-7200.

May 21 PageMaker II Course. San Francisco. Media Alliance/Computer Access. Call: (415)771-7133.

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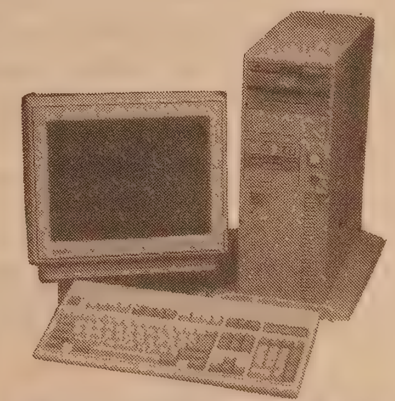

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May 25 Macintosh Network Administration Class. San Jose. Abacus Training. Call: (415)974-7200.

May 26 Advanced FoxPro 2.0 Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

May 26 Beginning Persuasion Class. San Francisco. New Horizons. Call: 1-800-999-9654.

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May 27–28 4th Dimension Class. San Francisco. Abacus Training. Call: (415)974-7200.

May 27–28 Microsoft Project Class. Walnut Creek. New Horizons. Call: 1-800-999-9654.

May 27–28 NetWare For NSF Class. San Francisco. Abacus Training. Call: (415)974-7200.

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June 2 Beginning dBASE IV Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

June 3–4 Paradox PAL Language Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

June 4 Advanced Time Line 5.0 Class. San Francisco. Symantec Professional Services. Call: 1-800-786-8620.

June 5 Intermediate Mac Course. San Francisco. Media Alliance/Computer Access. Call: (415)771-7133.

June 7 Beginning Paradox Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

June 7 Intro To UNIX System V Class. Oakland. MIS Services. Call: 1-800-300-4MIS.

June 7–9 NetWare v3.11: System Manager Class. San Jose. Abacus Training. Call: (415)974-7200.

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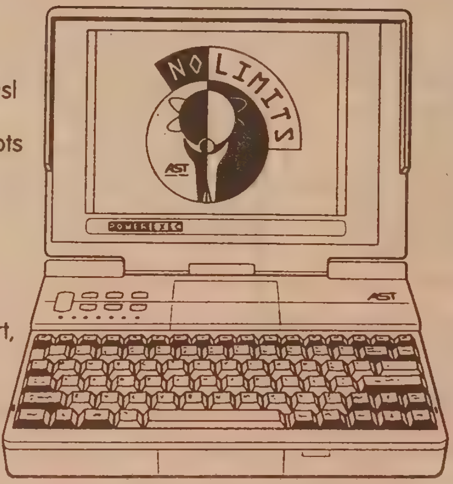

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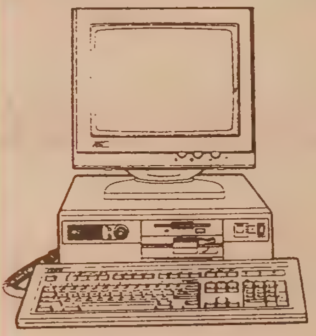

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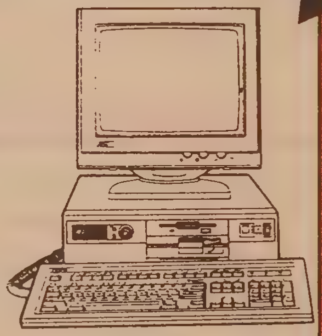

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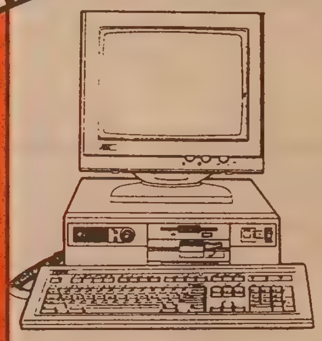

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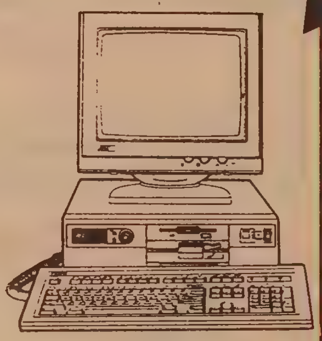
- 2 Serial, 1 Parallel, 1 Mouse Port



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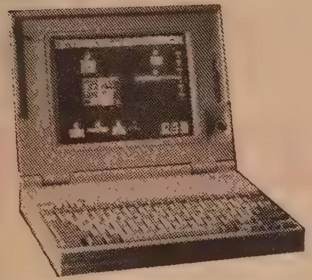

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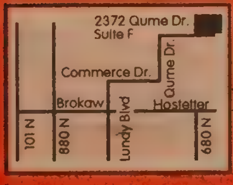

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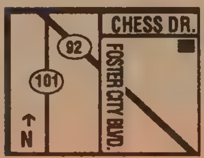

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RESOURCE LISTING CHANGES

As electronic bulletin boards continue growing, system operators are adding phone lines that include additional area codes. Beginning with issue #100, *MicroTimes* introduced a "Multi-Zone" category for BBSes with access phone numbers in multiple area codes.

Thank you,
MicroTimes staff

MULTI-ZONE

Fantasy Network. (408)985-1529, (408)732-4908, (415)365-7002, (415)321-3661, (415)573-1063, (415)244-9218, (415)928-4781, (510)797-4101. 24 hrs., Multiuser, interactive D&D style fantasy adventure game. Chatting, 8 nodes. [Exp. #108.]

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Interactions BBS. (408)258-8913, (415)469-5510, (510)832-0560. 12-line friendly chat (over 18 only), two-week free trial. Sysop: C. Watson. [Exp. #110.]

Lambda. (415)572-2591, 755-9439, (510)268-9891. Adult, mostly gay/lesbian, all are welcome. Email, chat, matching. Free. [Exp. #109.]

Portal Communications. (408)725-0561, (300–2400); (408)973-8091, (9600–57,600); (415)965-8059, (300–57,600). Worldwide X.25 online, shell, BBS & UUCP connections. Voice: (408)973-9111. [Exp. #109.]

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209

BerthaBoard. (209)823-0093. 1200–14,400. Two lines, 5.2GB, 70,000 files, lrg. msg. base. [Exp. #108.]

Extacy BBS. (209)962-4045. Adults only, four lines, 6000 files, and free adult video tape to new members. [Exp. #110.]

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A32 Macintosh User Group BBS. (408)378-8252. 24 hrs., 2400. Mac, First Class, members only. [Exp. #110.]

Amateur Action BBS. (408)263-3393. 8-N-1, 1200/2400/9600. 100% Adult Amateur GIF files, eight lines. [Exp. #109.]

Apple Byte GS. (408)578-3201. 1200/2400/9600. Apple II Support, member FVNet, running Metal/FutureVision, 685MB. Sysop: Jim Buchanan. [Exp. #108.]

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BayNar-Net. (408)926-8547. 24 hrs., 2400. Model rocketry, IBM programs, NAR affiliated, family oriented, NAR affiliated. Sysop: Phil Hayton. [Exp. #108.]

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The Beggar's Tomb. (408)243-TOMB. GIFs, stories, and animation for adult orientations. Sysop: The Grim Reaper. [Exp. #110.]

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BAY AREA BBSes

By Kathleen Creighton

The Secret Language Of BBSers

Learning how to access a new online service can be difficult enough, but imagine finally getting there and finding out that everyone speaks a language different from yours and that language includes pictographs. KWIM? :-) (Know what I mean?)

Smiley Contest

David Sanderson has compiled over 650 of those pictographs, known as emoticons, more commonly referred to as "smiley faces," in a slim, amusing book published by O'Reilly & Associates, Inc. (*SMILEYS*, O'Reilly & Associates, Sebastopol, CA, 1993, ISBN 1-56592-041-4).

To celebrate the occasion, O'Reilly & Associates announced the "Best New Smiley Contest." The person submitting the winning new smiley face will win $500.00. (Should two or more people submit the winning smiley face, the first person to do so will win the $500.00.)

Originally inserted into email messages to take the place of visual communication cues, smileys now run rampant throughout the online culture. They include sideways references to:

politics 7:^] (Ronald Reagan),

entertainment C]:-= (Charlie Chaplin),

history 4:-) (George Washington), and

myth @-) (cyclops).

They can laugh out loud %-(I), wink ;-), yell :-(0), frown :-(, and even drool :-)~.

To enter: Send your smiley face to smiley@ora.com or via mail to:

"Smiley Contest"
O'Reilly & Associates
103 Morris St.
Sebastopol, CA 95472

Eligible smileys will consist of characters found on computer keyboards that are written on one line. Contact the above address for a comprehensive guide to contest rules, too. The deadline for submission is October 1, 1993.

Essential Phrases For The Online Traveler

People online also have their own "shorthand," which can vary from service to service and subject to subject, like any jargon. The most common shorthand expressions are probably "IMO" (in my opinion), "IMHO" (in my humble opinion), "BTW" (by the way), and "FWIW" (for what it's worth). Others:

F2F	**face-to-face (meeting)**
IJWTS	**I just want to say**
IOW	**in other words**
ROTFL	**rolling on the floor laughing**
TMOT	**trust me on this**
TPTB	**the powers that be**
WADR	**with all due respect**
YMMV	**your mileage may vary**

Individual online services can have their own vocabularies, like different accents. On The WELL, "gopod" is the highest divine power, and a whole cyberculture has sprung up around "YOYOW" (you own your own words). Prodigy has a rich family dialect—SAHM" for stay-at-home mom, "DH" for "darling husband," "DS" and "DD" for darling son and darling daughter, or "LDs" for little darlings, often inserted with a touch of irony. Usenet seems particularly fond of "SO" (significant other).

Stumped? Don't be afraid to ask what an abbreviation means, or if there's a glossary of common terms available online. And new terms spring up all the time.

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RESOURCES:

Brian Erwin, brian@ora.com -
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CBORN. (408)262-7876. 8-N-1, 1200/2400. Classified business opportunity research net. Sysop: Leo Bert. [Exp. #109.]

Comp-U-Ease. (408)286-8332. Engineering and CAD, related files and topics, hum for RIME email network. [Exp. #109.]

Cruzio. (408)423-9995. 8-N-1, 1200/2400/9600. Santa Cruz county email, USENET and scruz newsgroups, databases, files, MUD/chat. Sysop: Peggy Dolgenos. [Exp. #108.]

Escape To Other Worlds BBS. (408)956-1750. 8-N-1, 1200/2400/9600/14,400. SF/fantasy, comics, games, msgs., Three lines, D/L files. Mac and PC GIFs, 1.8GB. [Exp. #109.]

The FoxTail Inn. (408)778-5688. Dedicated to the Equestrian community. Fidonet/RBBSnet/Internet. Morgan Hill. [Exp. #108.]

Hard Core BBS. (408)246-3811. 24 hrs., 1200/2400/9600. Music-oriented board, w/gaming files, online games, great msgs. Free trial. Sysop: Merlin. [Exp. #108.]

The Harper's Inn BBS. (408)734-9448. 24 hrs., 14,400. Lots of doors, messages, JetNet node, VGA Planets. Sysop: Bugs. [Exp. #110.]

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BayView Graphics BBS. (510)799-6456. 8-N-1, 300–57,600. Graphics, telecommunications, & utils. BRRAnet, echo mail. Sysop: Bob Rider. [Exp. #108.]

The Billboard. (510)429-0801. 24 hrs., 2400/9600/14,400. Dual CD-ROMs, msg bases, online games, 27,000+ files. Free. Sysop: Bill Laster. [Exp. #109.]

Bust Out BBS. (510)888-1443. 24 hrs., 14,400. Six nodes, 3GB, huge msg and file network (many adult). Computer systems and software services. Sysop: Alex J. Riggs. [Exp. #109.]

Camphor Fountain BBS. (510)547-5741. 8-N-1, 2400. Law, family life, creative writing, recovery, world religions. Seven networks. No fee. Sysop: Linda Martin. [Exp. #109.]

The Chemical Want Ads. (510)449-4778. 8-N-1, 14,400. BBS for the Chemical industry. Forum for discussion of topics as well as classified ad section. Sysop: Kevin Johnson. [Exp. #108.]

The Clubhouse BBS, Hayward Chapter. (510)785-1123. 24 hrs., 14,400 Genealogy, Teen, WordPerfect, Lotus, dBASE, nudist/naturist, plus many more national echos. [Exp. #109.]

Compupal. (510)538-2040. 8-N-1, 24 hrs., 1200/2400. IBM PD, sports and Bible files, 120MB, nationwide message conferences. Sysop: Richard Yim. [Exp. #109.]

The Creative Dimensions BBS. (510)484-4944. 24 hrs., 1200/2400. Home of CD-MAN and more. Free downloads on first call. [Exp. #109.]

CyberBBS. (510)527-9012. 8-N-1, 2400. VR, cyber culture, music tech, discussions. [Exp. #108.]

Dear Theophilus BBS. (510)831-THEO. 300/1200/2400/9600/14,400. Games, 8000 Mac files, discussion, God talk. Free. Sysop: Mark Spaulding. [Exp. #108.]

The Diamond Mind. (510)791-1910. 8-N-1, 24 hrs., 300/1200/2400/9600,14,400. Emotional support, IBM and Mac files, Fido echos, chat, online games, adult areas. Free user level. Sysop: Diamond & Frank. [Exp. #110.]

The Dragonhead BBS. (510)582-8478. 8-N-1, 24 hrs., 300/1200/2400/9600/14,400. Online games, offline mail reader. Free access. Sysop: Ray Khechen. [Exp. #110.]

The Eagle's Lair. (510)370-6460. The Musicians BBS, free listings and adds. Online magazine *Rock the House*, games, transfers, FoxNet. [Exp. #109.]

Entrepreneur On-Line BBS. (510)791-0259. 8-N-1, 2400. Multi-node, 135,000MB online, small-businessperson theme. Free IBM download first call. [Exp. #108.]

FrEdMail Oakland. (510)834-2636. 1200/2400/9600. Educator/student network w/Internet mail access, OUSD Bilingual Ed support BBS. [Exp. #108.]

FrEdMail SnIndro. (510)895-1785. 1200/2400/9600. Educator/student network with Internet mail access, San Leandro HS, NorCal Hub. [Exp. #108.]

The Gemstone. (510)791-2965. 8-N-1, 1200/2400. EGA/VGA graphics w/mouse support, games, some files, Bignet, Fishnet, and local msgs. No fee. Sysop: Heather & AGATE. [Exp. #110.]

GIFt Shop. (510)689-4686, 689-4378. 24 hrs. Four lines, HiQuality graphics & animations, Windows, OS/2, DESQview, networking utils, multimedia, sound clips. Sysop: Waik Gan. [Exp. #109.]

GMV-BBS. (510)294-9052. 24 hrs., 300/1200/2400/9600. Multiline subscription BBS. Teleconference, private chat, email, SIGs, games, and file library for Amiga, IBM, Apple 8-bit, and Mac. Livermore. [Exp. #108.]

Gold Diggers BBS. (510)568-7807,,,23,23. 24 hrs., 2400–19,200.IBM, Atari ST, Amiga, and Mac, files and messages. Registration. $10/yr. Sysop: Harry H. Goldberg. [Exp. #108.]

Gospel Ministry Through PC. (510)932-8778. 8-N-1, 12:00 am–12:00 pm. 300/1200/2400/9600. Bible promises and daily devotion readings. Sysop: Dr. Daniel Maedjaja. [Exp. #109.]

Haddocks's Rations. (510)655-0145. From the ridiculous to the sublime. Raise you glass! Free. [Exp. #109.]

The Hardware Depot. (510)942-0762. [Exp. #110.]

ISME–Net. (510)643-6258. 300/1200/2400/9600. Industry Initiatives for Science & Math Ed., Lawrence Hall of Science, K12net educator/students network. [Exp. #108.]

Imperial City BBS. (510)631-1569. 24 hrs., 14,400. Many files, interesting msgs. No fees. Sysop: Byzantine and XModem. [Exp. #108.]

Initiative BBS. (510)654-2253. 8-N-1, 300/1200/2400. A political board established to support the Committees of Correspondence. Devoted to documents and discussion related to the left in this country and the future of the left. Sysop: Steve Willett. [Exp. #108.]

Kanon Tech BBS. (510)235-6839. 8-N-1, 24 hrs., 300/1200/2400/9600/14,400. C libraries, shareware, Echomail net, commercial software/hardware online store. [Exp. #110.]

The Krypt BBS. (510)447-4623. 1200/2400/9600/14,400. Full multimedia support BBS. Sysop: Donovan Sobrero. [Exp. #108.]

LANDA Windows-Novell BBS. (510)527-2120, 527-1423. 9600. Sponsored by LANDA, San Francisco Chapter, to focus on Windows and Novell related issues. Sysop: Paul Sosa. [Exp. #110.]

LZ Friendly BBS. (510)273-7830. DOS & Windows files, veterans info, and nationwide msg. base. All welcome. Free. Sysop: Lou Rothenstein. [Exp. #110.]

The New-Ark BBS. (510)796-0947. 24 hrs., 2400/9600. Tradewars, running on two CD-ROMs. Reg required. Sysop: Hiram Wolf. [Exp. #110.]

Night Court BBS. (510)376-4688. FidoNet hub, 80MB, reg NET BRE, Tradewars, Global Wars, and many others. Instant validation. No fee. [Exp. #110.]

Nightline-Vetlink BBS. (510)273-7830. 300/1200/2400/9600/14,400. Nationwide Echo mail link for veterans and others. DOS and Windows files. Free. Sysop: Jon Mansowski. [Exp. #109.]

Olde Stuff BBS. (510)530-3051. 8-N-1, 24 hrs., 2400. Antiques & Collectibles. Buy, sell, learn. Sysop: Bill Clark. [Exp. #109.]

Online Bible Reference. (510)505-9047. 16,800. Religion, news, politics, Windows, DESQview, unique book index. Sysop: Jeff Price. [Exp. #110.]

Otherworld Express. (510)843-9523. 8-N-1, 24 hrs., 2400. Msgs, text files, shareware, freeware, train motif. Free. Sysop: Conductor Chaos. [Exp. #109.]

The Party Wherehouse BBS. (510)256-9809. 8-N-1, 24 hrs., 14,400. Multinode, multinet, chatting, dating, specialty areas—RPGs, sports, and more. Sysop: Party. [Exp. #110.]

Psychic Link BBS. (510)849-3539. 24 hrs., 2400. Share with others interested in psychic abilities and energy. International caller base. Shareware. [Exp. #108.]

Continued

ASSOCIATIONS

American Association For Artificial Intelligence (AAAI). Call: (415)328-3123. Email: membership@aaai.org. [Exp. #107.]

Association For Women In Computing. Meetings: 1st Wed., 5:30 pm, San Francisco. Call: (415)979-8450. [Exp. #107.]

The Association For Worldwide Software Support Management. Meetings: 2nd Tues., Milpitas Sheraton. Call: Mikael Blaisdell, (415)865-1323. [Exp. #109.]

Computer Professionals For Social Responsibility. Meetings: 2nd Wed., 7:30 pm, UC Berkeley, Evans Hall, Rm. 608-7. Call: Judy Stern, (510)643-7499. [Exp. #109.]

IEEE Computer Society, San Francisco Chapter. Meetings: Varying Weds, 7:00 pm, SF State. Call: (415)905-4400. [Exp. #109.]

Independent Computer Consultants Association, Northern California Chapter. Meetings are open to all. Only national trade assoc. comprising non-aligned working computer professionals with in-the-trenches experience. Call: ICCA, (415)441-2948. [Exp. #106.]

North Bay Systems Professionals. Meetings: 3rd Wed., 7:00 pm, Holiday Inn, Terra Linda, 1010 Northgate Dr., San Rafael. NBSP provides a forum and network for systems professionals. Call: Harry Chapman, (415)291-0174. [Exp. #109.]

San Francisco Robotics Society Of America. Meetings: 1st Wed., 8:00 pm, Exploratorium, San Francisco. Free. Call: Brad Smallridge, (415)550-0588. [Exp. #111.]

Society For Technical Communication, San Francisco Chapter. Meetings: 3rd Wed. Call: (415)985-7121. [Exp. #107.]

Software Entrepreneurs' Forum. 3rd Wed., 6:30 pm, Elk's Lodge, 4249 El Camono, Palo Alto. Industry association dedicated to software developers and entrepreneurs, offering information and education on all facets of the software industry. Call: Information, (415)854-7219; reservations, (415)965-9003. [Exp. #109.]

United Sysops Association. Meetings: 2nd Wed., 7:00 pm, Coco's, 1035 S. Mary Ave., Sunnyvale. Organization of bulletin board sysops and users. Call: Bill Strouse, (408)739-9081. BBS: (408)739-8753. [Exp. #109.]

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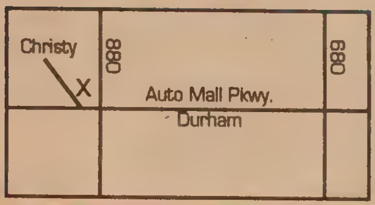

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USER GROUPS

ACCESS

Microsoft Access Developers Group. Now forming. Downtown San Francisco. Send name, address, and fax # to receive meeting and membership info, to: Computer/Management Solutions, 235 Montgomery St., #750, SF, CA 94104 [Exp. #110.]

ADOBE

Systems Adobe Technology Exchange: San Francisco Peninsula/South Bay Chapter. Meetings: 2nd Wed., 7:00 pm, M&T Publishing, 411 Borel Ave., San Mateo. Call: ATX, (408)562-6104. [Exp. #109.]

AMIGA

3rd Dimension—Imagine/Lightwave User Group. Meetings: 1st & 3rd Mon., 6:30 pm, Computer Showcase, 510 1/2 Fredrick St., SF. Call: Ollie, (415)863-8792. [Exp. #111.]

AAA—Amiga Addicts Anonymous. Meetings: 3rd Tues., Concord Water District Bldg., 1311 Concord Ave. Classes, monthly disks, info line. Call: (510)935-0829. [Exp. #109.]

ACCESS—Amiga & Commodore Computer Enthusiasts Society. Meetings: 2nd Thurs., 7:00 pm, Livermore Airport Terminal. Call: Paul, (510)829-6053. [Exp. #109.]

AUM—Amiga Users Of Marin. Meetings: 3rd Wed., 7:30 pm, College of Marin Science Center, Rm. 191, Kentfield. Beginners class at 6:00 pm. Call: (415)456-1411. BBS: (415)485-5895. [Exp. #112.]

AWEST Amiga Users In SF. Meetings: 1st Thurs., 7:00 pm, Laguna Honda School, Conference Rm., 1350 7th Ave., San Francisco. Call: (415)584-8406. BBS: (415)824-8774. [Exp. #112.]

FAUG—First Amiga User Group. Meetings: 1st Tues., 7:30 pm, HT Electronics, 275 N. Matilda Ave., Sunnyvale. Q&A, new product demos, public domain software. Call: Mike Fisher, (415)855-9816; BBS: (415)595-2479; Usenet: mikef@hpspd.hp.com. [Exp. #111.]

RE—AMIGA Redwood Empire Amiga User Group. Meetings: 3rd Tues., 7:30 pm, Robert Park Jr. HS, RM. C-5, 7165 Burton Ave., Rohnert Park. Call: (707)523-9978. BBS: (707)795-2717. [Exp. #112.]

TOGA—The Other Group Of Amigoids. Meetings: Varying Sat., 12:30 pm, Milpitas Library, 40 N. Milpitas Blvd. Call: Lawrence Brown, (408)984-6036. [Exp. #108.]

APPLE

PAUG—Peninsula Apple User Group. Meetings: 3rd Thurs., 7:00 pm, Ampex Cafeteria, 411 Broadway, Redwood City. All Apples. Beginners, advanced, Q&A, new product demon, PD software. Call: Roger Laker, (415)367-8657. [Exp. #113.]

AT&T

AT&T Computer User Group. Meetings: 1st Wed., general discussion at 6:00 pm, main program at 7:00 pm, 50 Fremont St., 40th Floor, San Francisco. Call: Jim Lansing, (415)885-6631 or Joe Mahoney, (415)584-6510. [Exp. #111.]

AT&T UNIX Computer User Group. Meetings: 4th Wed., main program begins at 7:00 pm, location varies, South Bay area. Call: Thad Floryan, (408)985-7100; USENET, thad@cup.portal.com. [Exp. #111.]

ATARI

DACE—Diablo Atari Computer Enthusiasts. Meetings: 1st Thurs., Contra Costa Water District Bldg., 1331 Concord Ave., Concord. Call: Dan Galant, (510)689-8256. [Exp. #113.]

COMMODORE

ACCESS—Amiga & Commodore Computer Enthusiasts Society. Meetings: 2nd Thurs., 7:00 pm, Livermore Airport Terminal. Call: Paul, (510)829-6053. [Exp. #109.]

C=HUG (Commodore Hayward User Group). Meetings: 2nd Sat., 2:00 pm, Palma Ceia Park. (510)531-3734. [Exp. #112.]

CWEST Commodore 64/128. Meetings: 3rd. Mon., 7:00 pm, UC Med Center, Bldg. C, Rm. C-213, 521 Parnassus, San Francisco. Call: (415)626-9946. [Exp. #112.]

CONTACT MANAGEMENT

Bay Area TeleMagic User Group. Meetings: 2nd Wed., 4:00 pm. Call: George Workman, (408)476-6385. [Exp. #110.]

The Golden Gate Telemagic User Group. Meetings: 2nd Wed., 4:30 pm, Flood Bldg., Room 1213, 870 Market St., San Francisco. Call: 1-800-238-3370. [Exp. #109.]

CP/M

San Francisco Computer Society. Meetings: 4th Mon., 7:00 pm, 7th Ave. Presbyterian Church, 1329 7th Ave., San Francisco. Call: Bob Forsberg, (415)885-6202. [Exp. #113.]

DBASE

Association Of Database Developers, dBASE SIG. Meetings: 4th Tues., 7:30 pm, The Gatehouse, Ft. Mason Center. $5.00 guest fee, free to ADD members. Call: (415)281-5638. [Exp. #110.]

Association Of Database Developers, Fox SIG. Meetings: 1st Thurs., 7:00 pm, PG&E Tower, 77 Beale St., Rm. 1760. $5.00 guest fee, free to ADD members. Call: (415)281-5638. [Exp. #110.]

DEC

BayVAC. Meetings: approx. monthly. Users of DEC hardware and software. Call: Rich Taylor, (408)776-4978. [Exp. #113.]

FREEDOM, PRIVACY, AND TECHNOLOGY

BMUG SIG On Freedom, Privacy, And Technology. Meetings: Last Sun., 2:00 pm, BMUG office, 2055 Center St., Berkeley. Call: Judi Clark, (510)549-2684. [Exp. #110.]

IBM AND COMPATIBLES

Berkeley PC User Group. Meetings: 2nd Mon., 7:00 pm, Winners Circle Systems, 2618 Telegraph Ave., Berkeley. Presentations followed by discussion, PD library, newsletter, Geo Ensemble SIG. No charge. Call: Mel Mann, (510)526-4033. [Exp. #110.]

Delta PC Users Group. Meetings: 3rd Sat., 10:00 am. Pittsburg Adult Ed., Rm. 23, 20 E. 10th St. Call: (510)427-2255, ext. 744. [Exp. #110.]

DVPC—Diablo Valley User Group. Meetings: 1st Thurs., 7:30 pm, Bank of America, Bldg. B, Clayton Rd. at Galindo, Walnut Creek. SIGs include WordPerfect, Windows, Paradox, Beginner's, Visual Basic, education/entertainment, and new users. Call: (510)943-1367. [Exp. #110.]

EastBay FOG. Meetings: 2nd Wed., 7:30 pm, Episcopal Church of St. John-in-Montclair, 1707 Gouldin Rd., Montclair. All microcomputers, MS-DOS, CP/M. Call: (510)653-2627. [Exp. #109.]

Golden Gate Computer Society. Meetings: 4th Mon, 7:00 pm, San Rafael Community Center, 618 B St., San Rafael. Free intro to computers class at 6:00 pm. Call: (415)927-2909. [Exp. #113.]

IBM Technical SIG. Meetings: 2nd Thurs., 7:00 pm, Cubberley Community Center, 4000 Middlefield Rd., Rm. H-1, Palo Alto. Sponsored by Software Entrepreneurs' Forum. Call: Peter Harris, (415)329-1880. [Exp. #110.]

Micromate–CP/M–DOS Users Group. Meetings: 1st Thurs., 7:30 pm, Eclectic computer buffs. Chabot Observatory, 4917 Mountain Blvd., Oakland. Call: Ed Miller, (510)376-1611. [Exp. #109.]

PC Clone User Group. Meetings: 2nd Mon., 7:00 pm, Ft. Mason, Rm. C217. Visitors $3. Call: (510)684-0107. BBS: (415)652-1736 [Exp. #110.]

PC Clubhouse. Meetings: 1st Fri., 7:30 pm, Meiklejohn Hall, CSU Hayward. To share knowledge and PD/shareware software. Club has several BBSes in East Bay and Amador Valley. Call: (510)483-9500, 429-1007. BBS: (510)889-1932 (Hayward). [Exp. #112.]

PC Users Group Of The Redwoods (PCUGR). Meetings: 2nd Thurs., 6:30 pm, Santa Rosa Veterans Memorial Building. Call: (707)527-USER. [Exp. #110.]

Peninsula Computer Club. Meetings: 2nd Thurs., 7:30 pm, Social Room, 222 Laurel St., San Carlos. DOS and CP/M libraries. Call: Larry Welling, (415)593-9981. BBS (415)571-9259. [Exp. #109.]

San Francisco Business Computers. Meetings: 4th Tues., 5:30 pm. For those who use computers in business. Visitors $5. Call: Jordan Rosenberg, (415)788-5338. [Exp. #111.]

San Francisco PC Users Group. Meetings: 3rd Tues., 6:15 pm SIGs, 7:30 pm General Meeting. Fort Mason, Bldg. A. Call: (415)979-5879. [Exp. #112.]

Silicon Valley Computer Society—SVCS. Meetings: 2nd Wed., 7:30 pm, Hewlett-Packard, Bldg. 48, Oak Room, 19483 Pruneridge Ave., Cupertino. Call: (408)956-0864. BBS, (408)956-0317. [Exp. #113.]

South Bay WordPerfect User Group. Meetings: Monthly, dates vary. Saratoga Community Library. Free. Call: Martin Van Derpool, (408)238-8434. [Exp. #113.]

Stanford Palo Alto Area User Group. Meetings: Last Wed., 7:30 pm, Varian Aud., 3075 Ilansen Way, Stanford. DOS/Windows. Free. Call: (415)329-8252. [Exp. #113.]

KNOWLEDGEMAN

Bay Area KnowledgeMan (And Guru) User Group. Meetings: 1st Tues., 6:30 pm., JNZ, Inc., 826 Las Trampas Rd., Lafayette. A forum for discussion and info concerning mdbs products, esp. KnowledgeMan and Guru. Call: (510)947-4878. [Exp. #108.]

LANTASTIC

LANtastic User Group Of The East Bay. Meetings: 6:00 pm, 2770 Marin Blvd., Berkeley. Call: Loretta, (510)444-1441. [Exp. #109.]

LAPTOPS

HPX HP Laptops & Handhelds. Meetings: 2nd Sat., Sunnyvale. Call: Michael Felsenstein, (415)564-8279. [Exp. #111.]

LEGAL

SF Bar Assoc. WordPerfect User Group. Meetings: 3rd Wed., noon of odd numbered months. Brown bag meetings. SF Bar Assoc. Boardroom, 7th Fl., 685 Market St. Call: (415)421-5650. [Exp. #111.]

MACINTOSH

A32 Macintosh User Group. Meetings: 2nd Sat., 10:00 am, GTE Bldg 3 Cafeteria, 100 Ferguson Dr., Mountain View, corner of Central Expressway and Highway 237. Call: (408)263-0398. [Exp. #111.]

BMUG—Berkeley Macintosh User Group. Meetings: Every Thurs., 6:00 pm, Physical Sciences Lecture Hall, UC Berkeley Campus. Call: (510)549-BMUG. [Exp. #109.]

Diablo Valley Macintosh User Group (DVMUG). Meetings: 3rd Tues., 7:00 pm, Old Republic Title Co., 3000 Clatyon Rd., Concord. Get together w/Mac and Performa users. Enjoyable SIG meetings. Call: (510)945-4548. [Exp. #111.]

International Macintosh User Group (IMUG). Meetings: 3rd Thurs., 6:45 pm, location varies. A forum for multilingual computing. Call: Roger Sherman, (415)859-5146. [Exp. #113.]

Let's Go Macintosh Computer Society. Meetings: 3rd Thurs., 7:00 pm, Skyline Jr. College, Media Center, Rm. 2105, San Bruno. See and try interesting new products, meet other Mac users, hear guest speakers. Call: Fidel Cajulao, (415)221-2995, or Nolan Apostle, (510)947-2523. [Exp. #108.]

Macintosh SIG. Meetings: 3rd Tues., 7:00 pm, Apple Cafeteria, City Center 4, De Anza and Rodrigues, Cupertino. Sponsored by Software Entrepreneurs' Forum. Call: Jeff Cherniss, (408)999-2524. [Exp. #110.]

MaCruzers. Meetings: 2nd Wed., Santa Cruz. Call: Peter Visel, (408)454-0403. [Exp. #109.]

Macs Of Marin. Meetings: Last Wed., 7:30 pm, Corte Madera Rec Center, 498 Tamalpais Dr., Corte Madera. Marin County Mac User Group for all levels of expertise, beginners welcome, SIGs. [Exp. #112.]

PAUG—Peninsula Apple User Group. Meetings: 3rd Thurs., 7:00 pm, Ampex Cafeteria, 411 Broadway, Redwood City. All Apples. Beginners, advances, Q&A, new product demos, PD software. Call: Roger Laker, (415)367-8657. [Exp. #113.]

SPC Apple User Group. Meetings: 2nd Wed., 7:30 pm, Fremont Main Public Library, 2400 Stevenson Blvd. Call: Dean Fearn, (510)881-9160. [Exp. #112.]

MULTIMEDIA

DesignSIG. Meetings: 3rd Tues., 6:00 pm. New SIG open to independent businesspeople in graphic arts, word processing, and related fields. Focus to share concerns and solutions related to running own business. Call: Bill Brent, (415)282-7368. [Exp. #113.]

International Interactive Communications Society—IICS. Meetings: 2nd Tues., 7:00 pm, alternate locations San Francisco and South Bay. For people involved or interested in developing and using interactive multimedia technologies. Call: IICS Hotline, (415)252-8114. [Exp. #113.]

Macromedia User Forum. Meetings: 1st Wed., 7:00 pm, 600 Townsend, at 7th St., San Francisco. Authoring, 3-D, content, and tools. Call: John Dowdell, (415)665-3916 (days); email: 71165.3065@compuserve.com. [Exp. #112.]

Multimedia SIG. Meetings: 1st Thurs., 7:00 pm. SIG of Software Entrepreneurs' Forum. Call: Ralph Gilman, (408)746-0551. [Exp. #111.]

NANOTECHNOLOGY

The Assembler Multitude. Meetings: every other Mon., 7:30 pm, University Lutheran Church, 1611 Stanford Ave., Palo Alto. An open discussion of new technical developments in Nanotechnology and social consequences and dangers of Nanotechnology. Organized by Ted Kaehler. Email: Kaehler2@AppleLink.Apple.com. Address: 20525 Mariani Ave., MS 301-3D, Cupertino, CA 95015. [Exp. #110.]

Nanosystems Study Group. Meetings: Alternate Mondays, 7:30 pm, University Lutheran Church, 1611 Stanford Ave., Palo Alto. The study group will go through Eric Drexler's book, *Nanosystems: Molecular Machinery, Manufacturing, and Computation*. Announcements and mailing list, contact: Ted Kaehler, email: Kaehler2@AppleLink.Apple.com. Phone: (408)974-6241. [Exp. #110.]

NETWORKING

NetSIG. Meetings: 4th Tues.,

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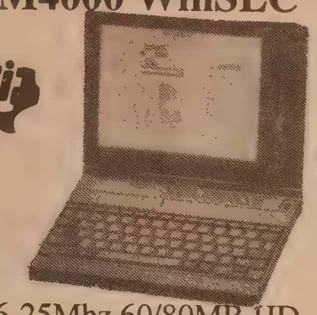

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- 10" VGA 640 X 480
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486SLC performance
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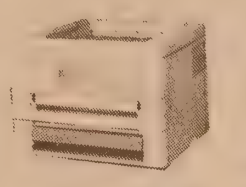

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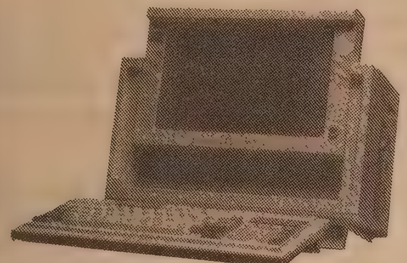

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- VGA 640 X 480 16 Gray Scale
- 2 Serial 1 Parallel
- 120MB Hard Disk
- One yearWarranty Parts & Labor

LCD	Gas plasma	color
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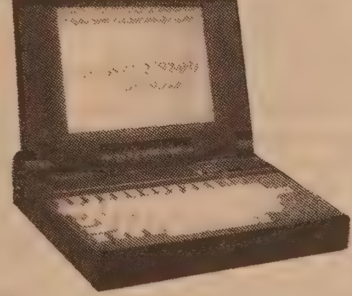
486-33DLC NOTEBOOK



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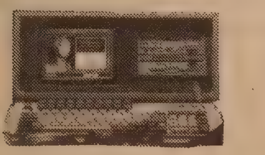

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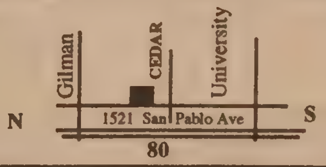

7:00 pm, Novell Sunnyvale. Networking SIG for Software Developers. SEF group. Call: Skip Addison, (408)277-5867. [Exp. #111.]

NEXT

BANG—Bay Area NeXT Group. Meetings: 3rd Wed., 7:00 pm, Terman Aud., Stanford. Presentations and lectures. Call: (415)327-BANG. Email: info@BANG.org. [Exp. #109.]

NOVELL

Silicon Valley Novell User Group. Meetings: 3rd Wed., 6:30 pm, Sundowner Inn, corner of Ross and Mathilda, Sunnyvale. Call: Bill Strouse, (408)739-9081. BBS: (408)739-8753. [Exp. #112.]

OS/2

OS/2 Bay Area User Group. Meetings: 4th Mon., 7:00 pm. For anyone interested in OS/2. Presentations, product demos, questions and answers. Call: (415)755-3124. [Exp. #109.]

OS/2 SIG Of San Francisco. Meetings: 2nd Wed., 7:00 pm, location varies. Call: Margery Blum, (415)931-3110. [Exp. #112.]

PARADOX

SVCS Paradox SIG. Meetings: 3rd Tues., 7:00 pm, Tandem Coputers, Bldg. 251, 10100 N. Tantau, Cupertino. Call: Scott Jackson, (408)738-0424, or Doug DiMartini, (415)688-8404. [Exp. #113.]

PROGRAMMING LANGUAGES

APL Interest Group Of Northern CA. Meetings: 2nd Mon., 7:00 pm, Syntex Labs, 3401 Hillview Ave., Palo Alto. A member SIG of ACM. Call: (408)742-5277. [Exp. #110.]

C/C++ Programmers Network. Write: Rick Rowe, 3245 S. White Rd., Suite 106, San Jose, CA 95148-4056. Email: rown@netcom.com. [Exp. #109.]

North Bay Forth Interest Group. Meetings: 2nd Sat., 1:00 pm, 2055 Center St., Berkeley. Tutorial at noon. Call: Leonard Morgenstern, (510)376-5241. [Exp. #113.]

Peninsula/South Bay Visual Basic SIG. Call: Allan Colby, (415)851-4657. [Exp. #110.]

Power BASIC Study Group. Meetings: Now forming. Call: Thipdar, (510)783-1972. [Exp. #111.]

Sacramento Forth Interest Group. Meetings: 4th Wed., 7:00 pm, SMUD, 1708 59th St., Rm. A., Sacramento. Call: Bob Nash, (916)487-2044. [Exp. #113.]

San Francisco North Bay Smalltalk/V User Group. Meetings: Every other month in downtown SF. Call: David Freihofner, (415)362-4283. Email: dfrei@well.sf.ca.us. [Exp. #112.]

SF Bay Area Visual BASIC User Group. Call: Gustavo Eydelteyn, (510)547-7295. [Exp. #111.]

Silicon Valley Forth Interest Group. Meetings: 4th Sat., 10:00 am, Applied Biosystems, Inc., Conference Room A/B, 230 Lincoln Centre Dr., Foster City. Call: Art Hampton, (415)873-8554. [Exp. #113.]

R:BASE

R:BASE Developers Group. For meetings and membership info, call: (415)956-1200. [Exp. #110.]

SYBASE

Sybase User Group. For information, write: Sybase User Group, attn: Mar-Com, User Group Membership, 6475 Christie Ave., Emeryville, CA 94608. [Exp. #113.]

TELECOMMUNICATIONS

BMUG Telecom SIG. Meetings: Last Wed., 8:00 pm. How to use your modem, terminal programs, and the BMUG BBS. Call: (510)549-BMUG. [Exp. #110.]

TEXAS INSTRUMENTS

Santa Clara Valley TIPC Group. Meetings: 4th Thurs., 7:00 pm, Magnolia Inn, 176 S. Bernardo, Sunnyvale. Newsletter, library. Call: Ralph, (510)526-2492. [Exp. #109.]

TI-99/4A. Meetings: 2nd Sat., Oakland. Call: Fred, (510)530-8335. [Exp. #109.]

THEOS

Theos User Group. Call: (510)785-7355. [Exp. #108.]

UNIX/XENIX

BACUG—Bay Area Coherent User Group. Meetings: 3rd Sun., 2:00 pm, San Mateo. Call: Viki Tamaradze, (510)549-1876; email: johnp@dumbcat.sf.ca.us. [Exp. #113.]

N. California UNIX SIG. Meetings: New group, just forming. UNIX, XENIX, LINUX, Coherent. Call: Randy Just, (707)769-1648. [Exp. #112.]

UNIX SIG. Meetings: 2nd Tues., DEC, 800 W. El Camino Real, Mountain View. Sponsored by Software Entrepreneurs' Forum. Call: Priscilla Rowe, (415)776-0513. [Exp. #110.]

VIDEO TOASTER

Video Toaster User Group. Meetings: Last Thurs., 7:30 pm, HT Electronics, 275 N. Mathilda Ave., Sunnyvale. Special guests, equipment demos, hands-on workshops, plus info/tips on new System 2.0. $4 for non-members. Call: Andrew Timmins, (408)243-9233 (eve). [Exp. #108.]

VIRTUAL REALITY

Virtual Reality Group. Meetings: varies. VRG is a nonprofit organization dedicated to supporting and promoting the development of VR technologies in the Bay Area. Everyone welcome. Call: Linda Jacobson, (415)826-4716. Email contacts: Linda Jacobson (lindaj@well.sf.ca.us), Peter Rothman (avatarp@well.sf.ca.us), or Timothy Childs (tchilds@well.sf.ca.us). [Exp. #110.]

Virtual Reality SIG. Meetings: San Francisco, East Bay. Call: Mike Conduris, (415)566-8681. [Exp. #110.]

WINDOWS

BMUG Windows Programmers SIG. Meetings: 1st Tues., 6:30 pm, 2055 Center St., Berkeley. The Programmers SIG is a forum for Windows programmers of all levels to meet and exchange information. Call: Ferdinand Rios, (510)526-3031. [Exp. #109.]

WinSIG. Meetings: 1st Wed., 6:30 pm, Cubberley Community Center, Rm. H-1, 4000 Middlefield Rd., Palo Alto. Windows SIG of the Software Entrepreneurs' Forum. Call: Fran Finnegan, (415)288-4400. [Exp. #113.]

Is Your Listing Missing?

Free user group and association listings are limited to the group's name and a ten-word description, including the mailing address and contact phone number. They will be **deleted at six-month intervals** to ensure timeliness and accuracy of information. **Free BBS listings** are also limited to the board's name, sysop's name, and a ten-word description including parameters, baud rate, phone number, and registration fee. Because we have an ongoing problem of boards shutting down without telling us, much to the annoyance of would-be callers and the new phone number's owner alike, we will **delete these listings after they've run three months.**

You can update or renew your listings at any time. If yours is missing, send us a new one! Send your listing information to: US Mail should go to: MicroTimes User Group, 3470 Buskirk Ave., Pleasant Hill, CA 94523. **Faxes** are welcome at (510)934-2417 or (213)851-8303. **Email** can be sent to: microx@well.sf.ca.us. Or MCI:MICROTIMES.

Quasatron BBS. (510)846-6085. 24 hrs., 9600. IBM, Ham radio, electronics, games, graphics, utils, etc. No fees. Sysop: KC Mazie. [Exp. #109.]

Records Dept. BBS. (510)426-0470, 426-0793. Amiga, IBM, Mac, Fidonet, games, chat. Free, extras for subscribers. [Exp. #108.]

Russian Connection BBS. (510)651-6809. 8-N-1, 24 hrs., 2400. USA-Russian business/politics oriented. Membership available. Sysop: Alex Alshvang. [Exp. #110.]

Sir James BBS W/ Magick Resource Center. (510)261-6567, 261-6863. Nets: Fido, Pods, Dharma, Bignet. Rooms: pagan/magick, music, adult, Sound Blaster, and more. Free/val. reg. Sysop: Sir James. [Exp. #110.]

SpeakEasy. (510)522-1700. 8-N-1, 14,400. 16 lines, downloadable program for mouse support. Files, chat, Internet access soon. Sysop: Jim Kestler. [Exp. #108.]

Tiger Team. (510)268-0102. 14,400. Games, data encryption, PC Security, Buddhism, GIFs, Fidonet, Dharmanet. Star Trek conference. Free. [Exp. #109.]

The Transfer Station BBS. (510)837-4610, 837-5591. 8-N-1, 24 hrs. Free Internet/USENET access. Lrg DOS/Windows/OS2 library. No fees. [Exp. #109.]

Viper 1 Premium BBS. (510)535-0231, 535-0315. 8-N-1, 24 hrs., 2400/9600/19,200. Multiline, 900MB, 1.3GB online, large adult file areas, games, file scanning facilities online. [Exp. #108.]

The Warped BBS. (510)939-8344. 300/1200/2400/9600/14,400. Sysop: Mike Baker. [Exp. #110.]**Windows Online.** (510)736-8343. Windows BBS and publisher of WinOnLine Review. Over 8,500 Win 3.x & 17,000 DOS files, 7GB, 14 lines using USR-DS modems. Free trial. [Exp. #110.]

Winshare BBS. (510)686-4464. Multi-node, your connection point for Windows/DOS shareware/support. Running Wildcat! Free trial account. [Exp. #109.]

Wishing Well BBS. (510)745-7901. Email, matchmaker, files, 100+ online games, adult sig/files, ANSI art, and more Sysop: MaryLou White. [Exp. #109.]

Worldview BBS. (510)676-2919. 8-N-1, 24 hrs. 1200–14,400. Reformed Christian perspective, files/discussion on philosophy, public policy. $49/yr. Sysop: Bill Gram-Reefer. [Exp. #109.]

Wrencher's Workbench. (510)357-0927. 24 hrs., 300/1200/2400/9600/14,400. Echos, msgs, files, doors, games, auto help, and advice. [Exp. #110.]

707

The Cutting Edge BBS. (707)747-5605. 24 hrs., 14,400. Great adult section, 90+ doors, net mail, files. Free. [Exp. #110.]

Dobbs Enterprises. (707)427-0277. 300/1200/2400/9600. 6 CD-ROMs, UN'I Net, 60,000+ files online, multi-line. [Exp. #109.]

Mnemonic BBS. (707)451-8353. 300/1200/2400/9600/14,400. 2 CD-ROMs, 10,000+ files, netmail, doors. [Exp. #109.]

Recommended BBS. (707)448-2225. 24 hrs., 300/1200/2400. Multiuser games, teleconference, conversational, and technical areas, 16 lines. All welcome. Sysop: Jay C. Parangalan. [Exp. #109.]

The Software Zone. (707)765-2447. 2400/9600/14,400. 3000+ files, programming oriented. TRUE graphical interface. [Exp. #108.]

The WINd Tunnel. (707)421-0380. 24 hrs., 1200/2400/9600/14,400. Windows programs and utilities, games, WAVs, and TrueType fonts. BRRAnet echo mail. Sysop: John Wright. [Exp. #110.]

916

24th Street Exchange. (916)451-7179. 8-N-1, 24 hrs., 300/1200/2400/9600/14,400. 16 lines, 4 CD-ROMs, well-maintained. [Exp. #108.]

Starship Enterprise BBS. (916)338-4674. 8-N-1, 300/1200/2400/9600. 330MB, CD-ROM, IBM, Amiga, HP95LX Palmtop, Ham, Sacramento Clarion User Group. Sysop: Aaron Bond. [Exp. #109.]

continued from page 220

Inc., 319 S.W. Washington St., 11th Fl., Portland, OR 97204)

PAINTER V1.2

Published By: Fractal Designs
List Price: $349
Reviewed By: Matthew Leeds

Painter is a deceptively simple program. It doesn't offer every single tool ever seen in any paint program, it doesn't include structured drawing tools, a database function, text tools and a spelling checker, or an integrated billable time forms generator. Instead it provides the basic tools a painter or illustrator needs to replicate their traditional drawing and painting environment, and does so with a remarkable fidelity. It also allows for a tremendous degree of personal expression.

Painter's tools are customizable for size, behavior, and expression. In other words, you can create just about any look you want. You can also customize paper texture, color, and image brightness and contrast. Additionally, you can create friskets for masking effects. For example, you can simulate the characteristics of a crayon, pencil, felt marker, charcoal, watercolors, or other "brush." You can control the bristle type, or "hairiness"of a brush, how much paint it deposits per stroke, or how soft (how much it spreads) a brush is.

Paper textures also control the look of color applied to a surface. You can use the included surfaces like canvas, rice paper, rough grain, or make your own. You can record and play back brush strokes if you want to create a standard effect, or apply a stylistic rendition of Van Gogh's or Seurat's techniques to your work.

Features new to this version include a rotation tool, virtual private scrapbook, posterizations, new paint bucket and fill tools, and support for CalComp pressure-sensitive digitizer pens. Painter always included support for Wacom tablets. It reads Photoshop files as well as PICT, TIFF, and RIFF. It is the perfect companion product to Photoshop.

If you don't own a paint program, Painter is the one to get. If you already own a paint program and are not getting the look you want, then you want Painter. (Fractal Designs, Inc., 510 Lighthouse, Suite 5, Pacific Grove, CA 93950. 408/655-8800)

ARTZ ADB TABLET

Manufactured By: Wacom Technology
List Price: $449
Reviewed By: Matthew Leeds

Wacom has long produced some of the best graphics tablets for the Macintosh. Their pressure-sensitive, batteryless, cordless pens are a joy to use, and the serial port connected tablets have a low profile and responsiveness second-to-none. However, since Mac's only have two serial ports, the ports are often in use for LocalTalk, printer, or modem connections. The ArtZ tablet connects to the ADB port. This eliminates the bulky serial interface box used with the earlier tablets and frees up a serial port. Starting in July an ADB splitter will be included in the box.

The new tablet has the same low profile, and now offers twice the range of pressure sensitivity of the original Wacom tablet. It has a transparent overlay that can be lifted to allow original art to be placed beneath it for tracing or use as a template. The new tablet also has a powerup button similar to that found on the Mac keyboard.

A new pen is included with the tablet. It is 27% lighter, thinner, and has a button on the side of the barrel that can be programmed to simulate a single or double mouse click, or perform other tricks. It also comes with several replacement tips.

The new Control Panel software lets you create customized pressure settings, program macros, as well as set up unique settings for each application you use. You can scale the tablet to cover a portion of the screen, the entire screen, or span several monitors.

The ArtZ offers the same great performance of the original Wacom tablet, with less hardware on your desk, a better pen and software, and all for a lower price. (Wacom Technology Corp., 501 S.E. Columbia Shores Blvd., Suite 300, Vancouver, WA 98661)

CLINTON: PORTRAIT OF VICTORY CD-ROM

Published By: Warner New Media
List Price: $39.99
Reviewed By: Matthew Leeds

I'm a sucker for documentaries. The sense of getting inside information, of hearing and seeing the real deal is seductive and enticing. *Time* magazine photojournalist P. F. Bentley spent months inside the Clinton campaign, taking thousands of pictures for a series of profiles for *Time* and a book published by Warner Books. This CD contains three times the photos found in the book and adds music, audio narration, and on the Mac version, QuickTime video clips. (The CD will play on either a Mac or DOS computer.)

Bentley worked exclusively in black and white, and his images are exquisite. The CD is broken into three segments: the assignment, a look at Bentley's work from his perspective with information on technical details that will educate photographers; the candidate, focused on Clinton's background and his speeches; and the campaign, a historical timeline of events from his declaration of candidacy to his victory celebration.

Warner New Media often takes chances in the material they publish. Some of their titles miss the mark or fall flat; this one is a hit, check it out. (Warner New Media, 3500 Olive Ave., Burbank, CA 91505)

BOOK REVIEWS

PHOTO CD: QUALITY PHOTOS AT YOUR FINGERTIPS

Written By: John Larish
Published By: Micro Publishing Press
List Price: $27.95
Reviewed By: Matthew Leeds

If you've been living in a cave the last year or

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3COM 3C507 16-BIT ETHERLINK	304
3COM 3C507 5 Pack, (1 Doc/Drivers)	1,347
3COM 3C509 ETHERLINK III 16-bit/5-pack	145/650
INTEL ETHEREXPRESS 16	135
INTEL ETHEREXPRESS 16 MCA	176
INTEL ETHEREXPRESS 16 5 Pack (1 Doc/Drivers)	600
INTEL ETHEREXPRESS 16 20 Pack (1 Doc/Drivers)	2,007
NOVELL/EAGLE NE2000 16-Bit	139
NOVELL/EAGLE NE2/2C 16-bit Micro Channel	253
SMC ETHERCARD ELITE 16 Coax/6-Pack	127/688
SMC ETHERCARD ELITE/A FOR PS/2	217
3COM 3C579 ETHERLINK III 32-bit Coax	**299**
3COM 3C579 ETHERLINK III 32-bit Coax 5-pk	**1,150**
ACCTON 32-Bit EISA Coax/10BaseT Combo	450
INTEL ETHEREXPRESS 32-Bit EISA	465
NOVELL/EAGLE NE3200 32-Bit EISA	711
NOVELL/EAGLE NE2/32C 32-Bit MC	543

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HTI 10 Base-T transceiver (AUI to RJ45)	89
IMC BNC Mau (AUI to BNC)	99
3COM 3C503-16TP ETHERLINK II 16 16-bit	209
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3COM 3C507 ETHERLINK 16-bit TP	340
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INTEL ETHEREXPRESS 16 TP 5 Pack	600
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SMC ETHERCARD ELITE 16T 10 Base-T 6 Pack	514
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3COM Tokenlink III 16/4 10 Pack	4,498
INTEL Token Express 16/4 16-Bit	460
SMC Token Ring Adapter 16/4 16-Bit	361
SMC Token Ring 16/4 12-Pack	4,103

External/Pocket Adapters

IBM Credit Card Ethernet Adapter (PCMCIA)	296
Credit Card 10BaseT Adapter (PCMCIA)	296
Credit Card Token Ring 16/4 Adapter (PCMCIA)	628
XIRCOM Pocket Ethernet Adapter III BNC	305
Pocket Ethernet Adapter III 10BaseT	305
Pocket Ethernet Adapter III COMBO	330
External Ethernet Adapter	414
Credit Card Ethernet Adapter (PCMCIA)	290
Credit Card 10BaseT Adapter (PCMCIA)	331

MacIntosh Products

ASANTE MC+IIE64 Coax/MAC II	158
MC+IIET64 10 BaseT/MAC II	158
MC+30iE64 Coax/IIsi & SE/30	158
MC+30iET64 10 BaseT/IIsi &SE/30	158
EN/SCPB Thick/Thin/10BT for Powerbook	346
EN/SC10TPB 10BaseT for Powerbook	283

10 Base-T Concentrators

ASANTE 8-Port Concentrator	299
12-Port Concentrator	526
1012 12-Port Smart Hub	820
1701 Smart Hub 12-port w/SMNP module	966
Asante View for Windows	710
EAGLE 4-port Hublet Mini-Repeater	228
EXOS/MICRODYNE 16 port 10 Base-T Concentrator	621
INTEL Int. EtherExpress TPE Hub/ISA (12 ports)	565
INTEL Int. EtherExpress TPE Hub/EISA (12 ports)	641
INTEL Hub Expansion Board (12 add'l ports)	490
SMC 3508TP 8-Port Concentrator	329
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Intel's 32-Bit Server Adapter *

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* Received PC Magazine's Editor's Choice Award (February 9, 1993)

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3COM FMS Management Module	635
3COM FMS Isoview Software	249
3COM FMS Management Software	640
NETWORTH 6-Slot Chassis	802
10-Slot Chassis	1,610
Host 10BaseT Module	1,234
Smart 10 BaseT Module	1,791
EtherManager Software	1,234

Repeaters

ACCTON EtherRepeater 2 AUI/2 BNC	685
IMC LANextender BNC/BNC-limited to 1 per lan	325
IMC Dual Port Ethernet Repeater BNC/BNC	492
IMC Quad Port Repeater	600

Network Printing

CASTELLE JETPRESS BNC/10Base-T	436
DIGITAL NETSprint/100 BNC/10Base-T	504
FRESH TECH Printer Assist (Software)	175
INTEL NETPORT II for Ethernet	529
INTEL NETPORT II for 10 Base-T	529
INTEL NETPORT II for Token Ring	760
XIRCOM PRINT SERVER (New Product)	415
XIRCOM MULTIPLEXOR (Super Low Price!)	50

Network Fax

CHEYENNE FaxServe VAP/NLM	679
OPTUS FACSys NetWare Fax Server Software	651
INTEL Satisfaxtion Modem 200	330
INTEL Satisfaxtion Modem 400	447
INTEL Net Satisfaxtion Software (20 users)	653
INTEL Net Satisfaxtion Software (1000 users)	1,068
JETFAX II 9250 w/1 MB	625
JETFAX II 9450 w/4 MB	1,016

Tape Backup Solutions

COLORADO DJ-10 120MB Int. Tape Drive	161
DJ-20 250MB Int. Tape Drive	226
TJ-10 120MB TRAKKER Parallel Port Tape Drive	395
TJ-20 250MB TRAKKER Parallel Port Tape Drive	479
PT-25 2GB SCSI Tape Drive w/Ctrl	1,110
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APC SMART-UPS 1250Rackmount	910
APC SMART-UPS 2000	1,294

Cabling Supplies

RG58 & RG62 Rachet BNC Crimper	75
RJ-45 Crimper	75
RG58 Ethernet BNC-Crimp (100 pak)	125
RG62 Arcnet BNC-Crimp (100 pak)	125
RJ45 10 BaseT Connectors (100 pak)	40
AT&T 10Base-T Cable (1000' min) Level 3/Level 5	100/200
BELDEN PVC RG58 or RG62 Cable (1000' min)	175
PLENUM RG58 or RG62 Cable (1000' min)	350
MICROTEST Quick Scanner	760
Pair Scanner	1,906
Cable Scanner	1,142
Next Scanner	2,925

Network Modems

SHIVA NET MODEM/E 9600 BNC	1,502
MICROTEST Ethernet LANModem	1,509
MICROTEST Token Ring LANModem	1,965
U.S. ROBOTICS Modem Sharing Kit V32BIS	635
U.S. ROBOTICS Dual Modem Sharing Kit	1,018
U.S. ROBOTICS Shared Access CommServ	1,495

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cc:MAIL DOS Platform V4.0	205
OS/2 Platform	344
WINDOWS Platform	344
MacIntosh Platform	344
Unix Platform (New Product)	648
10 USERS license	240
25 USERS license	587
100 USERS license	2,287
WORDPERFECT Office v3.1(Single)	149
1 Add'l User	75
20 Add'l User	819
100 Add'l User	3,645

Novell Software

UnixWare Personal Edition	185
LANalyzer for Windows v2.0 (New Version)	1,068
Lan WorkPlace for DOS (Single User)	290
Lan WorkPlace for DOS-10 Users)	1,445
Lan WorkGroup-5 Users	1,125
Lan WorkGroup-10 Users	1,866
Lan WorkGroup-20 Users	2,613
Lan WorkPlace for MacIntosh (Single User)	290
NetWare for Mac (5 Users)	359
NetWare Access Server Software	1,662

Network Utilities

CHEYENNE Monitrix Network Mgmt	595
Utils for NetWare 286/386	262
ARCserve NLM V4.0 (up to 5 users)	273
ARCserve NLM V4.0 (up to 20 users)	810
ARCserve NLM V4.0 (up to 50 users)	1,018
ARCserve NLM V4.0 (up to 250 users)	1,295
ARCserve Solo	185
MACserve NLM	269
DIRECT ACCESS Network Menu	366
FRYE UTILITIES NetWare Management v1.1	324
Early Warning System v1.1	324
Lan Directory v1.1	278
INTEL LanDesk Manager	712
XTREE XTNET Network File Manager	305

Peer-to Peer Networking

Lantastic A/I Software	70
AE-2 Adapter 16-bit Ethernet Adapter	217
AE-2 Starter Kit	498
AE-3 Starter Kit	579
AE-3 Windows Starter Kit	651
Lantastic For NetWare	300
Lantastic For Mac	578
Lantastic For Windows	177
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so you might not have heard about Kodak's Photo CD technology. This digital incarnation of home photography also offers some serious professional uses as well. The details of the consumer and professional uses for Photo CD, as well as a cogent (if incomplete) explanation of the technology behind the products, are all contained in this book on Photo CD.

At times it reads like a marketing handout from Kodak, and indeed, the author, John Larish, is a former marketing executive at Kodak. Other times it reads like a technical reference, offering tantalizing tidbits of technical trivia that tend to terminate without totally telling all.

This review was written just after the InterMedia CD-ROM trade show in April. Kodak made several announcements regarding Photo CD, including the release of software that allows individuals to produce their own Photo CDs, an authoring system to produce interactive Photo CDs, and an interesting quote from a Kodak exec that Kodak is now "a media company."

If you're looking for an overview of Photo CD, with occasional technical discussions, then this book is worthwhile. If you've already seen a couple of magazine articles that discuss Photo CD, then you've already got the gist of it. (Micro Publishing Press, 21150 Hawthorne Blvd., #104, Torrance, CA 90503)

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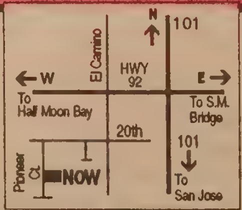

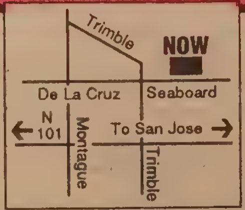

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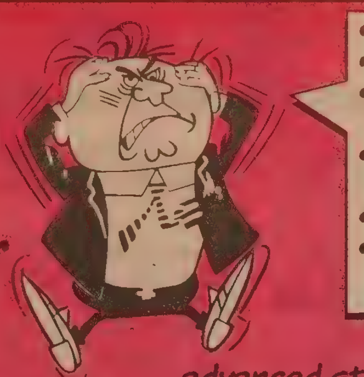

- Should I buy ISA, EISA or VESA?
- Which is better... IDE, SCSI or an ESDI Hard Drive?
- Has the true 50MHz VESA Local Bus been standardized yet?! Is it safe to buy?
- What the heck is "Bus Mastering"? Does my system support it?
- Do all hard drives support the Local Bus?
- Is the P24T OverDrive the same as the Pentium?

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2

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3

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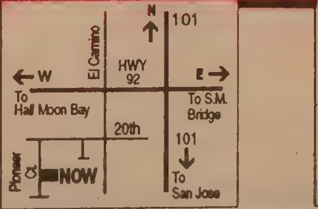

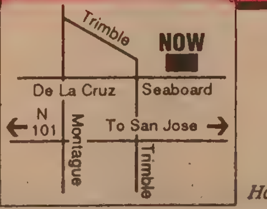

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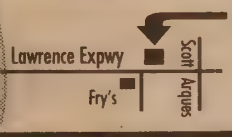

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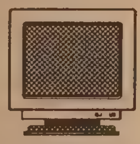

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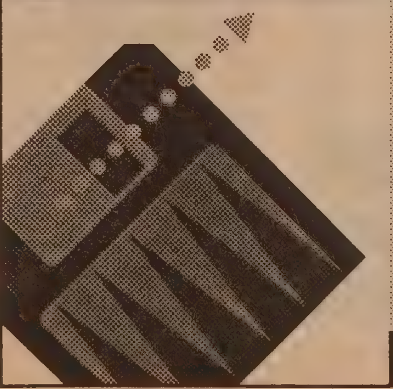

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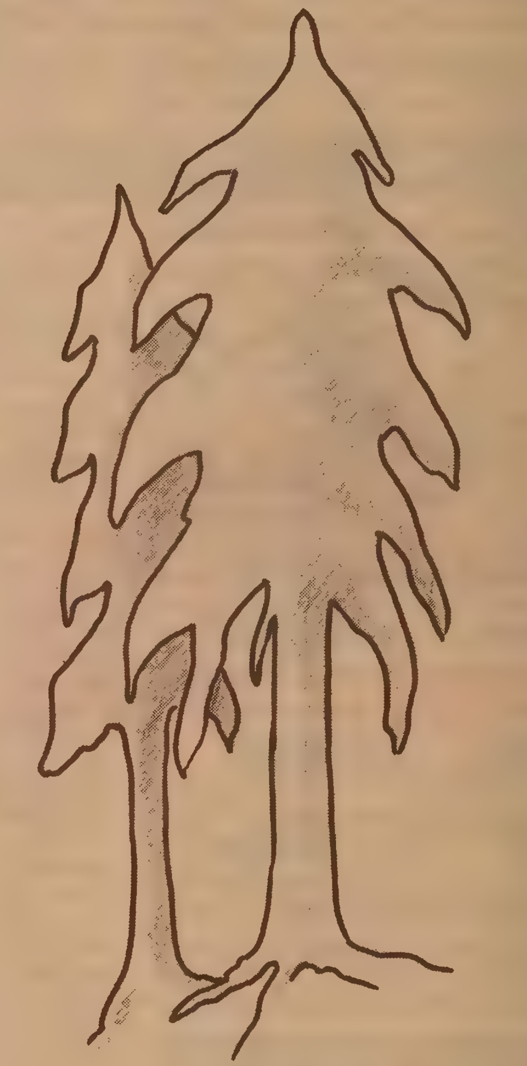

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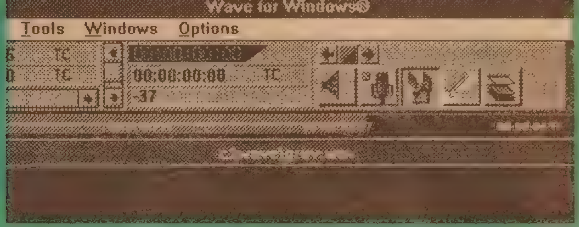

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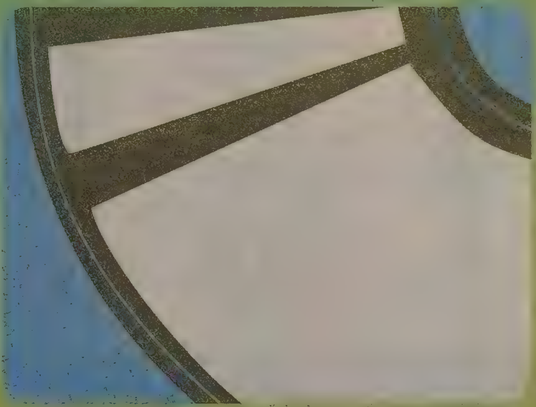
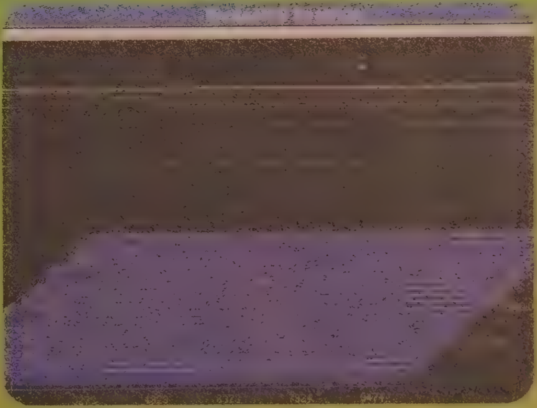




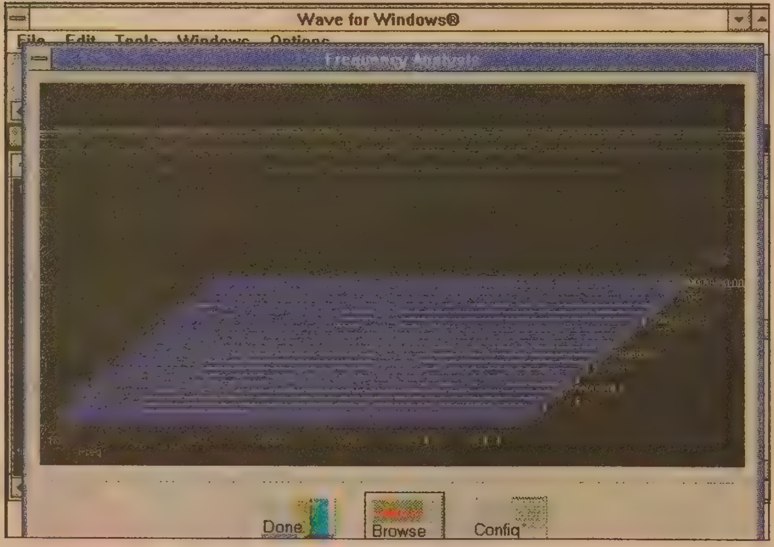
This month: Windows in the recording studio; Amiga at Warner Bros.; multimedia professionals give their views in Multimedia 101.

Turtle Beach Multimedia Sound Card Enters The Studio

A Top Studio Guitarist Finds Real Uses For Multimedia

BY RICH GRACE

For the last few years, we've witnessed a constant stream of hype about multimedia. Most of it has neither clarified the definitions of what is meant by multimedia nor brought with it a range of mass-market products promised. It's refreshing, therefore, to finally see some applications for the "multimedia technology" which clearly show off new and powerful ways to use your computer. We'll be looking at the experiences of a studio guitarist in Southern California as he explores Turtle Beach's MultiSound, one of the first PC-based multimedia cards to combine real power with a reasonable cost.



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Rich Grace is a free-lance and technical writer, and an enthusiastic user of PC, Mac, and Amiga platforms. He lives in Orange County. He can be reached on MCI Mail ID 484-6217.

THE USER

Rick White is a craftsman in his field, a solid, dependable music professional with a virtuosi command of his instrument. He's been involved in the commercial production of music and in live performance for thirty years. His credits are diverse and very numerous, with work done in blues, pop, rock n' roll, and jazz for artists such as Andy Williams, Sonny & Cher, Tracey Ullman, and many others. A compact, young-looking man in his mid-forties, Mr. White has lengthy experience with almost every music synthesizer and computer-based sound product in the market. He's worked extensively with both Macintosh and PC computers for producing music. Normally, White stresses reliability over flashy bells and whistles, and has

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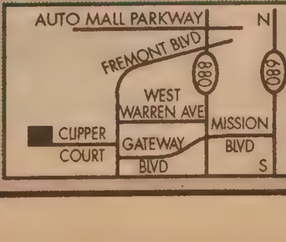

been using a DOS-based sequencer program for a few years, eschewing the more complex, expensive Macintosh solutions.

THE PRODUCT

Until recently, White has not been satisfied with the commercial PC-based multimedia products available to him. Most of the hardware and software products lack the flexibility and professional features he's looking for. Turtle Beach Systems has stepped forward with a unique product which offers remarkable power and flexibility with a fairly reasonable price. The product is called MultiSound, a high-resolution 16-bit multimedia sound card. multisound, however, is not merely a sound card in the manner of Sound Blaster or Ad Lib. It's a fully Multimedia PC (MPC)-compliant hardware-software solution for those who wish to record music tracks in real time directly to their computer's hard disk, thus enabling powerful sound editing and manipulation capabilities beyond the reach of most competitive products, and replicating the features of music industry devices costing many thousands of dollars more. Let's view a brief summary of MultiSound's features:

- Full MPC-compatibility—thus, all Windows MPC software products will work with it
- Direct to Disk Recording
- Complete E-mu Proteus/1 XR synthesizer onboard with 4MB of ROM (read-only-memory)
- Motorola 56001 DSP (digital signal processor) chip, which ensures efficiency in most operations on even a 386SX system
- Thirty-two simultaneous MIDI voices
- 64x oversampling digital audio
- Wave for Windows Direct-to-Disk sound editing and recording software

The MultiSound package has a list price of $995—costing far more than the under-$300 competitors such as Pro Audio Spectrum and Sound Blaster Pro, and certainly beyond the means of anyone who simply wants CD-ROM connectivity and the ability to play sound files. (Note, however, that street prices are often considerably lower.) A lot of competition has appeared since the latest NAMM (National Association of Music Manufacturers) show. Considering what the card has to offer, the price point is remarkably reasonable. Why? What does MultiSound offer for such a seemingly high price?

MULTISOUND IN DEPTH

To begin with, the Proteus/1 XR synthesizer is one of the most popular professional-quality synths available. It's sold in a traditional hardware box for $1995 list. The Turtle Beach card, with the full software setup, completely replicates the Proteus/1 XR panel func-

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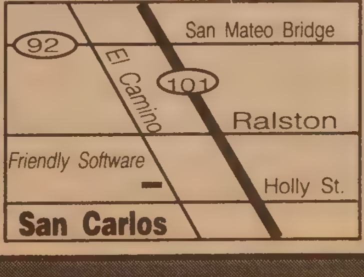

tions on the Windows screen. Thus, computer control of a professional-quality synthesizer is now a reality.

The Proteus synth is known for the high quality of its preprogrammed sounds. Its 4MB of on-board ROM (eXtended ROM, the XR in the name) offers a bank of 384 preprogrammmed sounds for use by the musician. These sounds can be swapped freely, and custom sounds can be placed into memory by the musician for later use. The general MIDI standard specifies a standard memory location for all sounds residing in memory on popular synthesizers and sound cards. This standard means that compositions produced on a Sound Blaster can be played freely on other cards. The Proteus synth on the Turtle Beach card adheres to this standard.

The Motorola DSP chip assumes real significance when one realizes that non-coprocessed cards such as the Pro Audio Spectrum advertise the same capabilities as Turtle Beach Multisound (44.1kHz stereo direct-to-disk recording and sampling) but wind up choking on all but the very fastest PCs. The 32-bit 56001 processor is the same DSP chip used in the original NeXT computer, and the Motorola 56x is widely considered the most powerful DSP chip family available. On the Turtle Beach card, it relieves the CPU of the stressful tasks of processing the direct-to-disk recording of MIDI tracks and aids in the speedy editing of sounds and compositions. Even on White's 16MHz, 386SX system, performance is fully functional.

White was at the NAMM '93 convention in Anaheim, and picked up a powerful tip from a Turtle Beach rep: for robust performance on relatively slow systems, Windows users need to disable all background programs, such as Adobe Type Manager, After Dark, and anything else that occupies processor cycles in the background. He noticed a dramatic improvement in direct-to-disk recording performance after doing so. Thus, the power of the on-board DSP becomes readily apparent. Turtle Beach may be the only vendor in its field to offer this capability. White explains, "Obviously, I need to boost my throughput. The Turtle Beach documentation strongly recommends a 486 for best performance. So far, though, the card has performed very well on my system."

White defragments, or optimizes, his hard disk whenever he's about to do some work with the MultiSound card. Otherwise, throughput is so badly hampered that skips and jumps occur in the recording as the read-write heads skip over disk sectors to find the next recording segment. The Turtle Beach documentation is unequivocal on this point. Direct-to-disk requires large contiguous segments of the hard disk for efficient recording.

SAMPLING SNIPPETS

When we refer to "high-resolution" sound recording, we're simply referring to the sampling rate. PC sound cards offer a number of options for digital sampling and recording. The most powerful, and most demanding on system resources, is the 44.1Khz, 16-bit stereo standard—true CD-quality sound. Consider, also, that the Turtle Beach card completely bypasses the PC's memory during di-

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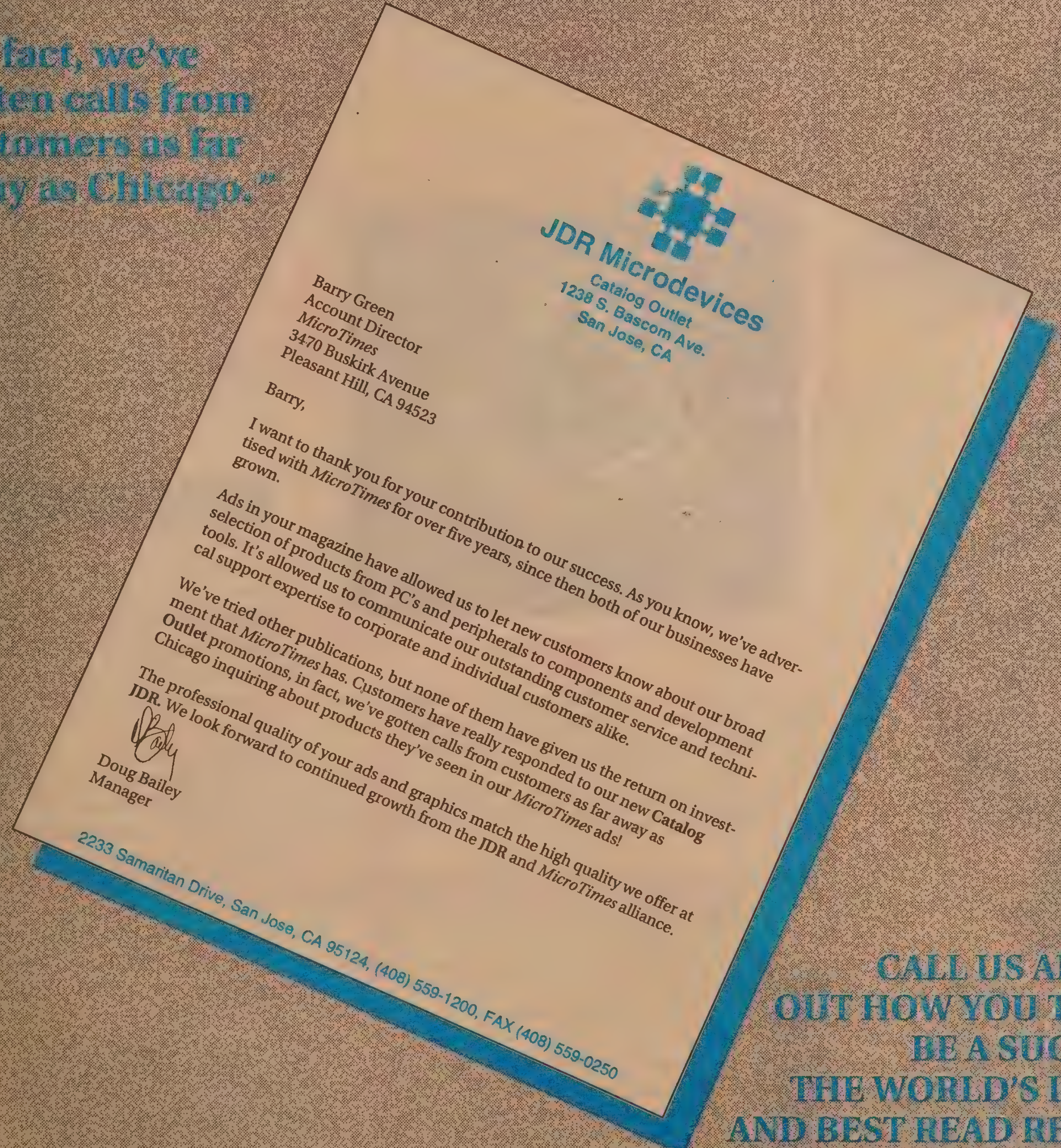

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rect-to-disk recording. Why direct-to-disk? Despite the relatively low prices of semiconductor RAM, disk space is still cheaper (particularly considering the recent price drop of large hard disks). If you're sampling and recording at true CD-quality levels, one minute of sound occupies over 10MB of memory! Desktop computers cannot be expected to hold such vast amounts of RAM, at least for the near future. Even 16MB or 32MB RAM systems (which are becoming somewhat more common) are not adequate for such a task.

As most of you also already know, sampling simply refers to the rate at which a digital recording device converts an analog input (say, an acoustic guitar being plucked in front of a microphone) into digital data. Eight-bit sampling means that for each second of recording, the sound is being converted to digital data 256 times a second. It's the minimum acceptable level for sound quality in digital data, and usually doesn't sound very good. Sixteen-bit sampling offers 65,536 conversions per second—hence "high-resolution" sound. At higher frequencies, and higher resolutions, much greater amounts of data are generated, which must be written to the hard disk every second.

At the highest sampling rate (44.1kHz 16-bit stereo), 176K of data is being written to the disk every second! This kind of throughput places heavy demands on any small computer, which is why the 56001 DSP chip on the MultiSound card is so important. Turtle Beach also claims that its analog-to-digital converters (ADCs) are so well isolated and buffered from other circuitry that high-end audio can be generated without the microprocessor noise that results from other systems.

THE SOFTWARE: WAVE FOR WINDOWS

Rick White has found the software bundled with the MultiSound card to be adequate for almost any task he's needed to perform. Wave for Windows is, for the most part, a solid, pro-level software package which enables recording and extensive manipulation of sound files in a variety of sampling rates and resolutions. Last year, you would have had to spend $15,000 for a good direct-to-disk recording device. Wave allows all the capabilities of such a device, with the ease of use of the Windows environment to boot. Direct-to-disk recording, in brief, means being able to edit music data directly on the hard drive with no loss of quality. The program *never actually uses the computer's RAM for editing* when you open sound files! Wave enables editing of sound files like a word processor, with full cutting-and-pasting features.

Turtle Beach calls its waveform editing functions "destructive editing," because changes to your waveforms on hard disk are irreversible once you make them—you're not using RAM as a buffer storage before the changes are saved into the sound file. Fortunately, an Undo Last Edit feature is available. All editing functions are handled by the DSP chip.

You can make adjustments to an entire sound file or just a small segment of it. You can change gain adjustments, employ a four-band parametric equalizer, apply muting to segments of a waveform; 3-D plots of wave-

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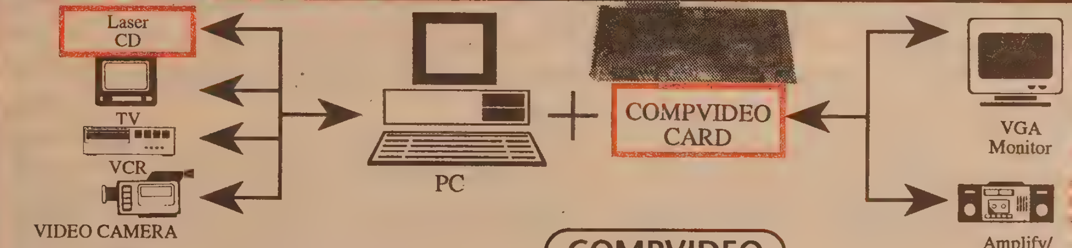

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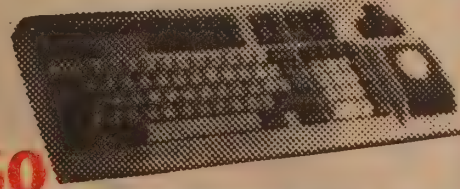

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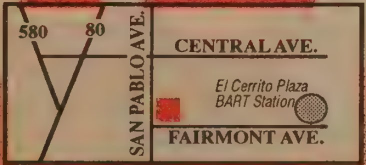

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forms can be generated with the Frequency Analysis feature, which has a powerful, specialized feature set of its own that includes a substantial number of controls and adjustments.

White has recorded acoustic guitar parts, using a microphone as his input device, and edited them using Wave for Windows. He then lays in the finished acoustic guitar track on an existing song, with precise control over placement, mixing, and almost any adjustment possible with digital sound editing. He's also using Wave to compile a DAT recording of many of his best studio recording dates and other gigs as a "musical resume" to send to prospective clients and others interested in his work. For that particular job, Wave's crossfade feature allows him to dovetail from one sound recording to the next in smooth fade-ins and fade-outs.

One of Wave's nicer features is its use of Windows' MDI (Multiple Document Interface) to edit and combine separate sound files. Four music documents can be open at once, and three direct-to-disk recordings can be combined into a fourth using Wave's Mix feature. All three recordings must be the same format and frequency: stereo or mono, 44.1kHz, and so on. White states: "The volumes of each recording can be adjusted, so that three stereo pairs can be combined much like a multitrack recorder—without loss or noise. The process is somewhat cumbersome and requires a little ingenuity, but it works!"

Also, he's found that if all three recordings are run at the same volume, particularly at higher levels, tremendous distortion can result. The way around this is to vary the decibel levels of the recordings. He's also found Wave's Invert feature a nice tool for taking an old mono sample and turning it around ("reversing the phase") to create a good pseudo-stereo sound from the thin-sounding mono original.

One major disappointment in Wave is its lack of provision for using MIDI events to trigger the playing of a sound file. This need is one for which no individual program or system has defined a solution, however. Overall, Wave for Windows replicates many of the key features of prohibitively expensive direct-to-disk devices without the exorbitant cost.

COST-EFFECTIVE HIGH-END SOLUTIONS

When you're confronted with the need for a serious multimedia project, and have to create a production system from scratch, you have two options: buy an expensive, high-end Macintosh or Amiga system and then spend another mint on the hardware and software to actually do the sound and video editing work, or skimp on the hardware end by buying a PC. An inexpensive and reasonably fast 386 or 486SX system, combined with the Turtle Beach card, and reasonable amounts of memory and hard disk space, will at the very least give you a significant edge in many areas of pro-quality sound production. ■

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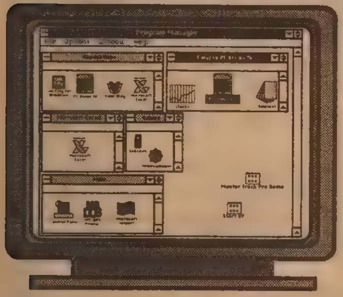

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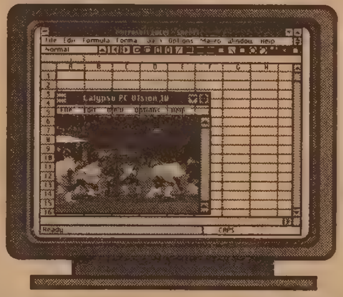

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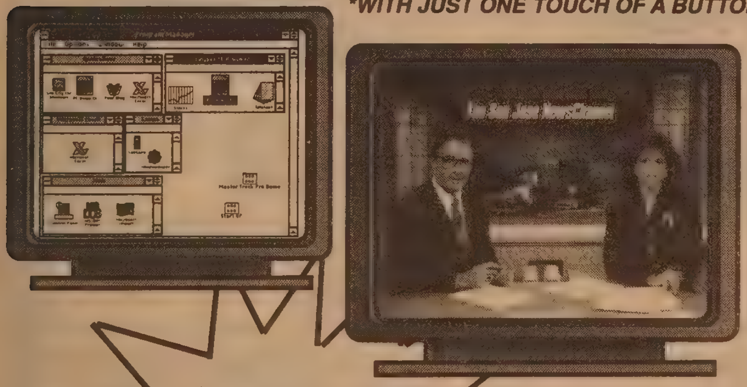

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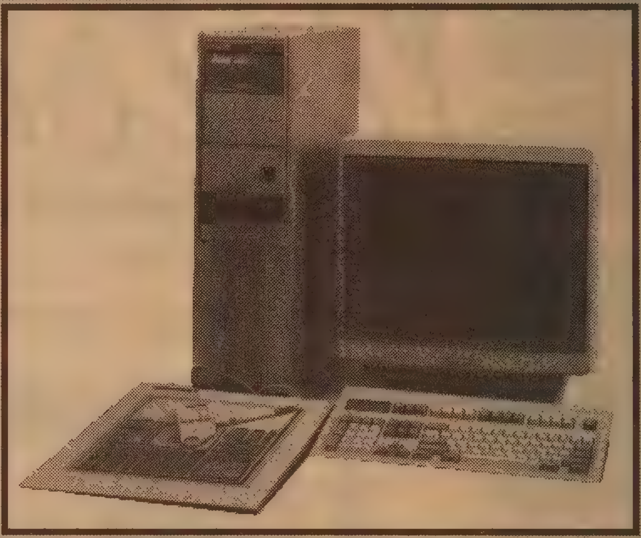

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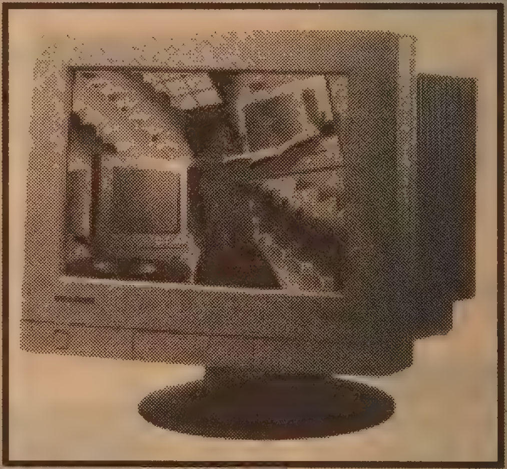

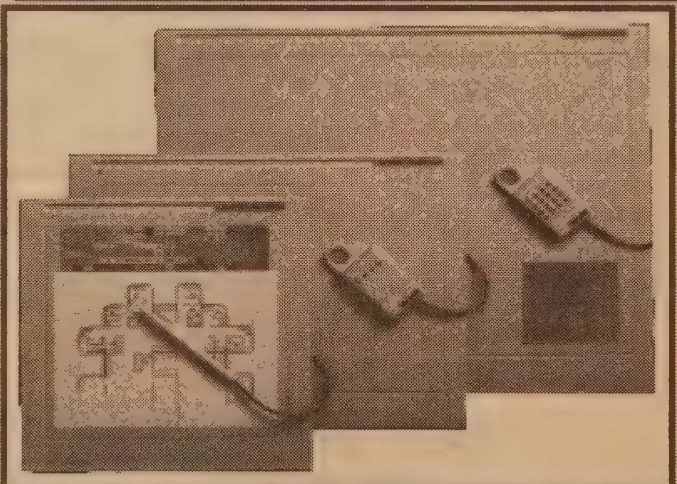

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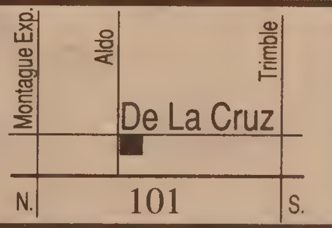

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BY DOUGLAS J. NAKAKIHARA

A few months ago, I wrote about how the Commodore Amiga was being used at Walt Disney Pictures and Television. Well, the Amiga is having an impact at yet another major company—Warner Bros. Animation.

One frame from a 50-frame animation by Rusty Mills. Background generated using VistaPro 2.0.

Warner Bros. is famous for the classic tales of Bugs Bunny, Daffy Duck, Elmer Fudd, Porky Pig, et al., but they are also responsible for such current ground-breaking animated shows as *Tiny Toons* and *Batman, the Animated Series.*

Rusty Mills is pioneering the use of the Amiga at Warner Bros. and sees great benefits in using the platform. An animation director at the company, Mills is responsible for controlling the visuals and the timing of the characters in his projects. "That's everything from the backgrounds the characters are working against, to the way the characters act, to how fast something is going to happen—everything like that," says Mills. Whenever possible, he is trying to use the computer to save time and money, while still meeting the high-quality standards of Warner Bros.

CREATING CARTOONS

Cartoons are generally created very methodically, using a time-honored system. (Though the word "cartoon" seems to be out of vogue these days, being replaced by terms like "animated series," etc., I'm going to use it anyway.) Once a script is finalized, dialogue is recorded onto magnetic film in a recording studio. From this recording session a dialogue-only audio track is transferred to cassette tape.

Work on a storyboard also commences

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with the final script. The storyboard contains hand-drawn pictures of key frames in the cartoon, plus dialogue, timing, and other directorial remarks. Once the dialogue and storyboard are finished, Mills "slugs" the storyboard. Slugging is the process of determining exactly how long every action is going to take, adding blank space as necessary to allow enough time for the action. For example, it might take a character 2 feet of film to walk out the door. This "slug" must be indicated on the storyboard.

Interestingly, animators use feet as a measure of time. A foot of film contains sixteen frames, and film is played back at a rate of twenty-four frames per second. So, for example, a portion of dialogue might be described as being 4 feet long—it requires sixty-four frames (4 feet x sixteen frames per foot) of animation and is 2.67 seconds long (sixty-four frames at twenty-four frames per second). As a result, the storyboard must show the length of each portion of dialogue in feet.

Once the storyboard has been slugged, an audio track with all of the slugs—pieces of old blank tape spliced into the original—can be made.

Based on the final audio track, an exposure sheet is created, explaining every single frame in the cartoon. That's nearly 29,000 frames for a twenty-minute animation!

The dialogue is broken down phonetically, frame by frame. There are also special "mouth codes," which correspond to pictures of the characters with their mouths in different positions. This provides a standardized way to indicate the shape of a mouth when a certain sound is spoken—necessary because the animators may not speak English. Without this, the cartoon might look like a English-dubbed Kung Fu movie.

The Warner Bros. artists must also draw example pictures, called models, of the characters, props (non-moving objects), and backgrounds. Since the people who will actually paint the animation are often located in a different country, it is important to give them as much information as possible. Models serve as examples to the animators to let them know what the character, prop, or background is supposed to look like. Most of these are black-and-white line art, but some must be colored to let the animators know the desired colors.

ENTER COMPUTERS

At Warner Bros., computers were first used to color in models. Prior to that, coloring directions were generally conveyed in writing, but the results were not always as expected. Now, the hand-drawn models are scanned into a Macintosh, where an ink-and-paint program called Linker is used to color them in. These colored models are printed out on a high- resolution Kodak dye supplemation color printer.

Linker is also used for pencil tests. These are short animated sequences similar in concept to page-flipping books where you rapidly flip through the pages to see a rough animation.

With all this information, the animators paint the actual cels that are used to make the cartoon. It takes at least

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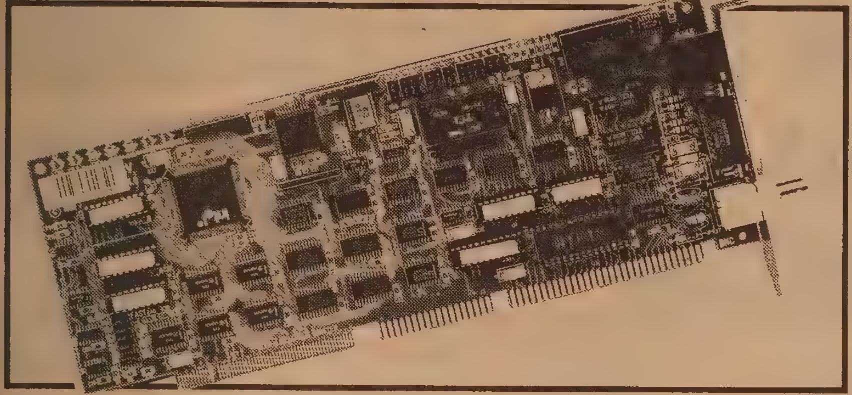

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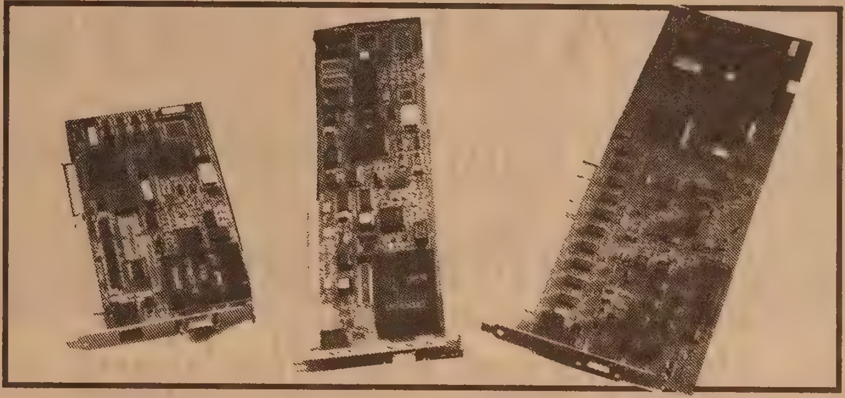

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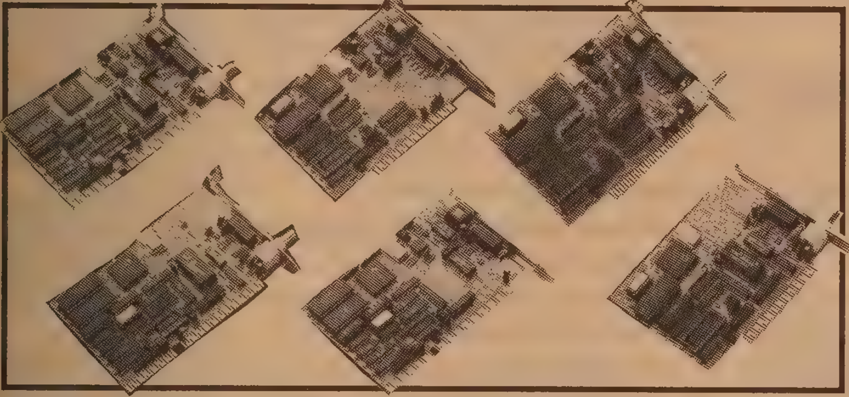

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sixteen weeks before Warner Bros. receives the animators' work back; only after all this can the film be edited and the music, sound effects, and dialogue added.

ENTER AMIGA

Mills recalls his experience using the Macintoshes already in-house: "It was a little slow for me, and they're using Quadra machines down there. This is still not as fast as I'd like it to be."

The head of the computer department, knowing Mills was very familiar with the Amiga, asked him to "take him out and show him an Amiga." Soon, they were both at a local Amiga dealer, but the dealer didn't have any 4000s there. Mills had to settle for demonstrating the Amiga using a 2000 with an '030 accelerator—fast but slower than a 4000. Even under these conditions, the computer department head was very impressed with the Amiga's fast screen refreshes. Later, after a meeting with representatives from Commodore, a brand new Amiga 4000 workstation was installed in Mills' office.

The workstation consists of an Amiga 4000 with 18MB of RAM on the motherboard, a 64MB ProRAM board from Progressive Peripherals, Impulse's Firecracker 24-bit display board, an Ethernet card, an IVS SCSI control card, a 400MB SCSI hard drive, a Syquest removable cartridge device, a 17" IDEK monitor, and a Commodore 1960 multiscan monitor. The IDEK is used as the main Amiga display and the 1960 is connected to the Firecracker.

For the most part, Mills uses the new AGA display modes for image processing, but relies on the Firecracker output to get the real 24-bit story. Though the Amiga's HAM8 display mode allows 256,000 simultaneous onscreen colors, it can still exhibit color banding and is just not as crisp as a true 24-bit display.

Mills' preference for the Amiga over the Macintosh is mainly a speed issue. "[It's because of] some of the manipulation that I'm doing with brushes and stuff like that. All the images, all the logos are brushes, and I can do these things so fast. It's that, and because I know it, that they decided to do it with the Amiga" says Mills. "And," he adds, "because of the cost"—although his setup cost about $11,000, it was still cheaper than a comparably equipped Macintosh workstation.

He emphasizes, however, that the Amiga is not replacing the Mac, it is being integrated into the Warner Bros. system. Because Warner Bros. is a multi-platform shop, it was imperative that the Amiga be able to integrate seamlessly. (The studio is also experimenting with Silicon Graphics Iris machines.) Fortunately, many Amiga programs like GVP's ImageFX, which Mills uses almost exclusively, support multiple-platform file formats. This allows you to generate an image on a Mac or a Silicon Graphics machine and then use the same file on an Amiga.

Initially, he had hoped to use the Syquest removable drive as a transfer medium, but because of various reasons this has not been implemented yet. For now, high-density floppy disks seem to be sufficient. However, once the computer department relocates—they are in the process of moving to the same building—the Amiga will be connected to the Macs using a local area network. Networks are becoming common, if not a necessity, in multi-platform environments.

Mills sees a great benefit having a computer in his office and therefore more accessible to the artists working on a project. He was also able to get the producer to approve things based solely on the computer display—something that had not been done in the past.

AMIGA IN ACTION

Mills first used the Amiga in an animation in a *Tiny Toon* episode. The story involved one of the characters flying a duck-bill-shaped spacecraft. The animators balked when they were initially presented with the standard storyboard/model information—they really didn't know what was wanted.

Mills used Impulse's 3-D rendering program Imagine to generate each frame of the sequence, so the animators only had to trace the frames and make minor modifications. (He adds that because the computer animation was "too perfect," they had to tweak it a little to give it more of a cartoon-like feel.)

The Amiga will also be used to generate the title cards for the upcoming *Animaniacs* series. Title cards are static images that appear at the beginning of a cartoon and include the title and the directing and writing credits. Traditionally, these are hand painted, and cost hundreds of thousands of dollars—pretty expensive for something that will only stay on the screen for a few seconds.

This being the case, the producer of Animaniacs did not want to use them, suggesting perhaps simple text over a colored background. Mills knew that it would be better if they had something with a little more pizazz. So, using ImageFX to do the drawings and Soft-Logik's Art Expression to do the text, he created some demo title cards on the Amiga. Where actual characters were required, he had them scanned and then brought over to the Amiga. ImageFX includes among its many 24-bit image processing capabilities, powerful painting tools. By just adding different titling, these images could be used more than once. Because the images were going to film, they were done at extremely high resolution, 2048 x 1544. ImageFX handled this resolution with no problems.

Says Mills, "When I first walked in with (the demo title cards), he looked at it and he says, 'No no no, we can't do this. This cost us way too much money on *Tiny Toons*.'" Mills explained to the producer that these were not

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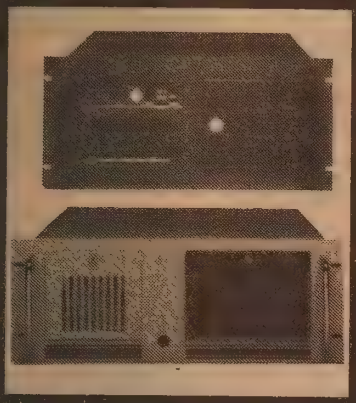

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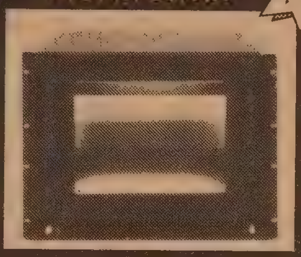

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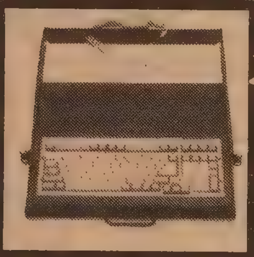

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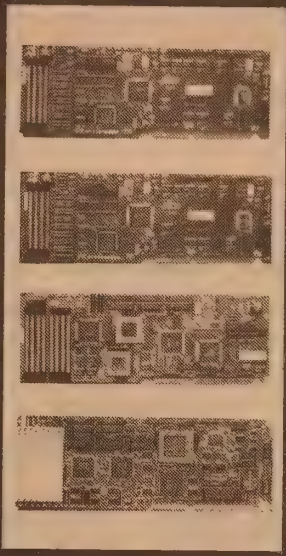

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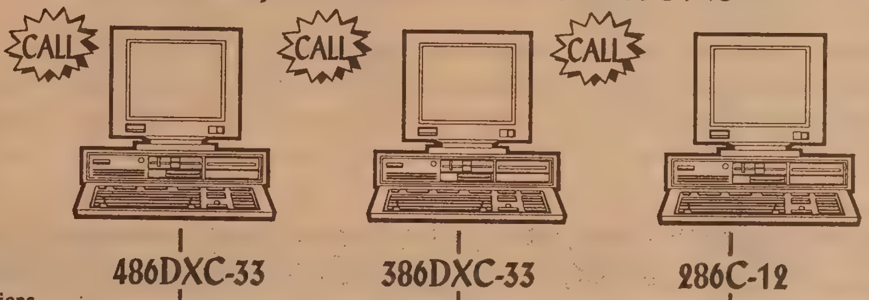

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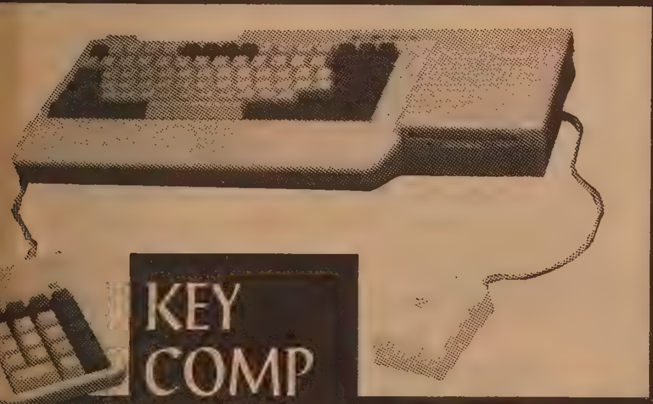

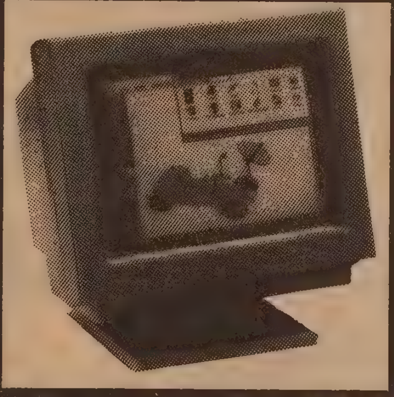

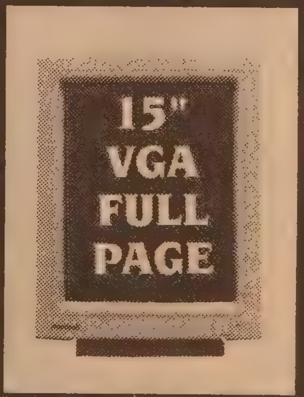

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paintings. Then the producer said, “These are going to take way too long.” Mills further explained that each one was completed in about a half hour, causing the producer to become very excited. After some further discussions, Mills was given the green light and as he puts it, “at that point, the Amiga was sold!”

The Amiga is also being used to generate an animated title sequence in *Animaniacs*. This will be accomplished just like the duck-bill spacecraft was done in *Tiny Toons*. The studio will also use the Amiga to generate some models to be sent to the animators. These models involve video cassette cases with titles and pictures on them. Once a case is defined in a 3-D rendering program, it can be viewed from any perspective and a model can be printed from that. So instead of drawing the cases by hand from different perspectives, they only have to be created once. It would be a simple task to map different titles and pictures on the same 3-D object—obviously, a tremendous time saver.

Warner Bros. purchased its first Amiga only this last November, so the machine's potential is still being explored. The Amiga offers a low-cost solution with powerful capabilities to animators. Not only can the Amiga handle black-and-white animation pencil tests, but it can also do full-screen, full-color, real-time animation, if necessary. Mills hopes to gradually use the Amiga more and more in animation production. Several people at Warner Bros. already have Amigas at home, and others are becoming interested after seeing what it can do.

In any event, the time when professional-quality cartoons are generated straight from a computer may be just around the corner. Perhaps the Amiga will have a hand in making that dream come true. ■

> Because Warner Bros. is a multi-platform shop, it was imperative that the Amiga be able to integrate seamlessly. Fortunately, many Amiga programs support multiple-platform file formats, which allows you to generate an image on a Mac or a Silicon Graphics machine and then use the same file on an Amiga.

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Multi & Media beyond

MULTIMEDIA 101

It's All A Matter Of Definition

BY JONATHAN E.

One of the metaphors for multimedia is that it's like that classic line about Los Angeles—thirteen suburbs in search of a city. With that in mind, I asked the participants in the Muchomedia conference on The WELL for a wide range of definitions of multimedia. The results were more focused than I expected, pointing toward the real economic engine of digital information and entertainment rather than the home-brew, garage-made variety of diverse possibilities.

Kevin Michael Rardin replied with a rather depressing observation: "The term 'multimedia' is first and foremost a buzzword that an industry is trying to wrap itself around. A friend and I have been having lengthy discussions about 'just what multimedia is, and we've both been pretty immersed in it for the past year working on different projects. Our most recent conclusion is that it is really nothing more than plain old ordinary TV. That's right: television. Whether you interact with it by plugging in a cassette tape and watching it or click buttons on a computer screen to navigate it or even use a Sega controller to play it, it all ends up being viewed on some kind of RGB device that's customarily referred to as a TV.

"Content, levels of interactivity, and such may vary from platform to platform, but with the coming proliferation of bandwidth for cable TV everything currently called 'multimedia' will be viewable/interactable/etc. on TV and nothing more. TVs may change with resolution enhancement but they're still going to be TVs. The idea that hundreds and potentially thousands of people are developing new ways of using television is great. Gotta fill up that bandwidth! But to try and distinguish the process or the 'industry' as anything more than television production or call ourselves anything other than 'media producers' is, to my mind, foolish and misses the point. Multimedia is TV; nothing more or less."

Robert Lauriston pointed out that "multimedia's a pretty broad term, including everything from opera to performance art to Cirque du Soleil. The computer industry's use of the term can be translated into English as, 'Are we selling expensive hardware yet?'" As far as digital multimedia is concerned, he agreed with Kevin "except that there is a significant distinction between what's possible on a personal computer and what's possible on a souped-up TV set, and that disparity will remain for at least several years and perhaps much longer."

Tim Victor argued that "the problem with simple definitions like this is that they wind up redefining TV as well as multimedia. If

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Jonathan E. has worked with desktop multimedia since 1988. He also writes about world music and the Archaic Revival for BAM. His USPS mailing address is c/o SoundSwell, 54 29th St., Richmond, CA 94804. His email address is jeve@well.sf.ca.us

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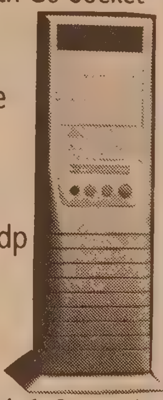

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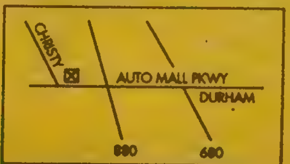

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multimedia is TV, then TV is something other than what I grew up watching."

However, he went on to say, "I do think there's a lot of merit in what Kevin's saying. Even if the TV becomes fully interactive, a lot of the interaction will just be telling it what you want to watch next." As far as "what's possible on a personal computer and what's possible on a souped-up TV set," he thinks "there's a lot of interesting places in there, many of which are being explored already. If you think of CD-I et al. as souped-up TV sets, how far away from computers are they? What's the key difference? A typewriter-style keyboard? A hard drive? Component rather than composite video?"

We are currently at a point where bright ideas, even with a relatively low budget, may meet with success and even shape the future.

The basis of Kevin's concern became apparent in his reply: "I was trained in instructional technology back in the late '70s when 'multimedia' had a meaning: multiple media. We had to learn how to combine slide projectors, movie projectors, stereo sound systems with mixers, lights, speaker lecterns and such into a single thoughtful presentation. I believe these are the roots of what we call multimedia today.... The TV I grew up watching is already changed by at least one if not several orders of magnitude, but it's still TV. By the time this industry grows to fill the five hundred channels TCI/Time-Warner et al. are talking about, it'll still be TV. It will probably combine the multimedia technologies of the '60s and '70s (which is all we're really doing now with our computers) with the broadcast technology most people accept as TV now. Certainly levels of interactivity will rise; resolution and performance will increase and a computerized interface will be mandatory. But the audience will still perceive it as TV and still ask each other 'What's on TV?' And the audience is who pays the bills. Work for them and you'll get paid."

Tom Mandel agreed, "but only up to a point. Most of the early stuff—advanced pay-per-view systems and entertainment video on demand—will be just TV, with a bit more convenience. But that's not all there will be."

TV OR NOT TV?

Chris Meyer expanded the discussion with a return to basics and a recognition of the burn-out that many early multimedia pioneers experience from time to time. "When I am in a positive mood, I say, 'Multimedia is the combination of any number of media types you choose to best get your idea across.' When I am tired of the M-word, I say, 'The first time someone put a picture next to type in a book we had multimedia, so it's nothing new; we're just getting more tools and chances to integrate it.' Lately I say, 'Games are the purest form of interactive multimedia; and maybe the only profitable one.' Ah, but I tripped into another one there at the end—some assume 'interactive' when you say 'multimedia'; I think the qualifier still needs to be there, since you can have linear or static multimedia."

Suzanne Stefanac remembered that "the nuns who indoctrinated me called corny slide-shows with music alongside 'multimedia.' We liked the word, kinda reminded us of rocket science. Now I think it just means wider bandwidth. Sound, motion, and interactivity are pluses that enhance some vehicles—rote learning, catalogs, adventure games, and (someday) encyclopedias. The fact is, widen the highway and data will follow. Lots of it will be bad, but that's the way the bell curve bounces."

Steve Krause distinguished multimedia from television with his comment that "another useful way of thinking about multimedia (and one that differentiates it from traditional television) is to see it not only as multiple media but also as a single, digital metamedium." He then neatly encapsulated both the present state of multimedia and what may be. "The fact that various media are all going digital allows some extraordinary new possibilities with this new metamedium, but the technology and the tools for exploiting the technology are at very early stages. Thus, we have an industry driven more on the promise of what can be done than the reality."

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WHAT MAY BE

These observations and definitions point toward a couple of undeniable features of multimedia. Its future in the consumer mass market will be highly reliant on Hollywood-style entertainment. And the hardware in that market will be closer to "a souped-up TV" than what we recognize as a personal computer today. Early examples of what might be coming along are the Sony Multimedia Player, Photo CD, and CD-I. All of these products have provoked disdain in some degree from those more used to real computers. I think part of this disdain comes from these products' technical shortcomings, but a possibly larger part comes from the cultural model they are based on—which is TV.

However, CD-ROM (in whatever format) is only a stopgap large storage medium. In ten years time, CD-ROM will have approximately the status of vinyl LPs today. Every corporation with fingers even near the pie is feverishly scurrying around to get your house wired or fibered or wirelessed so you can download whatever passes for entertainment then. It's going to be a crazy ride on the way there. The engineering and design problems are immense, financial constraints will slow some parts of this plan down, and the ongoing battles over government regulation will be fierce.

This is a long way from the idealism of multimedia pioneers. The vital impetus behind multimedia came from attempts to improve educational techniques. In this area there have been many worthy programs and products with some success and some that needed rethinking.

> **The vital impetus behind multimedia came from attempts to improve educational techniques.**

However, the real problem is that there is no economic engine on the scale of the entertainment industry. Education has now become a secondary concern for the driving forces of multimedia.

However, we are currently at a point where bright ideas, even with a relatively low budget, may meet with success and even shape the future. As has been said over and over again, content is crucial. The software and hardware will continue to evolve, platforms will converge and mutate, for the truly profit-driven entrepreneur there'll never be enough machines out there—but this is the time to line up your ducks as far as the conceptual work of creating the medium is concerned.

Desktop multimedia content so far can be crudely summed up as text with pictures and sounds attached. This will surely be an important category for some time to come. There are plenty of ideas waiting to be put into effect. Previously published books offer fertile ground for multimedia treatment, although many progressive thinkers feel that this is not a very exciting use for multimedia. However, authors with ideas that are difficult to compre-

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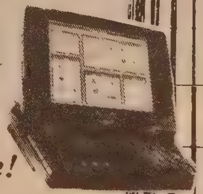

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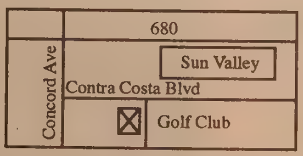

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hend and who have substantial video and audio aspects to their work, such as Terence McKenna (and he even has a software component), would make close-to-ideal titles. Mickey Hart is another example in this category. Multimedia magazines have been tried, but none seems to have quite cracked the problem. A specialist music magazine with a variety of critical opinions about the same piece of music and with that music available at the click of a button is something I'd love to see and hear. Art history and appreciation is yet another area that seems ideal, using a video narrative as backbone with plenty of options to see other works and call up background information.

However, what the world is waiting for is the multimedia D. W. Griffith. Think about it.

GET OUT OF THE HOUSE

There are a couple of interesting opportunities coming up to check out some of the artistic results of multimedia techniques.

OnLine Design hosts two evenings to showcase what happened when twenty Bay Area artists were given access to a variety of off-the-shelf multimedia hardware and software running on high-end Macs. Howard Vicini organized this extravaganza to see how graphic designers, photographers, and others in related design fields—but without professional video production experience—would adapt to the new technology. He promises that this will be entertaining in nature and not a trade show. The sponsors and providers of the equipment will not be allowed to speak unless they have something fun to say. There'll be video presentations, as well as spontaneous video, light, and sound performances by entertainers using QuickTime, music, dancing, light refreshments, and a no-host bar benefiting a local charity. Best yet—it's free. The two evenings are May 14 and 15, starting at 4:30 pm and running until 2 am. To obtain tickets (no admission without them), call (415)864-0267. Sounds like some great multimedia to me.

The San Francisco Film Festival has an example of interactive cinema running in the 3rd floor lobby of the AMC Kabuki 8 Theaters from 1:30–10:30 pm daily through May 13. According to its director Grahame Weinbren, "In its deliberate investigation of the possibilities of interactive drama, 'Sonata' aspires to lay the foundation for a new cinema, a cinema in which the response of the viewer affects his/her experience, a cinema of moment-by-moment collaboration between viewer and filmmaker. It opens a new dimension for the moving image, aligning the shape of film with the shape of thought, creating a cinema that portrays the world we live in and act on, rather than a world fitted to prior conventions." Now that's a multimedia sentiment! Apparently "Sonata" works by the viewer pointing at a touch-sensitive screen. This causes the main two intertwined narratives—the biblical tale of Judith of Bethulia and Tolstoy's first-person short story 'The Kreutzer Sonata'—to pause and be replaced by a recital of Freud's account of the Wolf Man's dream with the drawing the Wolf Man made to illustrate that dream. Point again and you return to where you were. No doubt when manifested as multimedia, "Sonata" is more involving than mere words convey. ■

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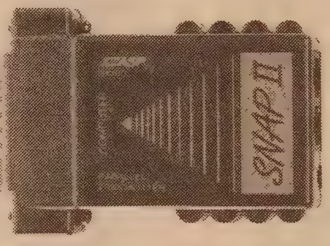

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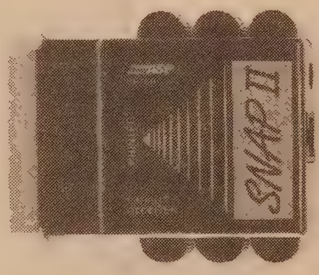

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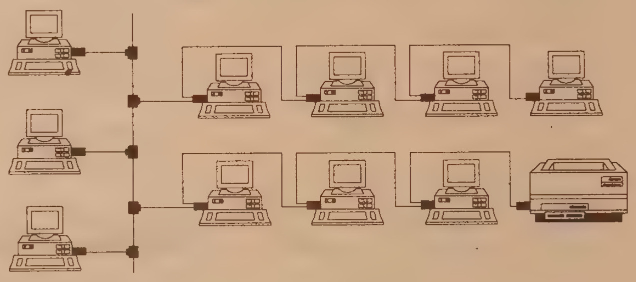

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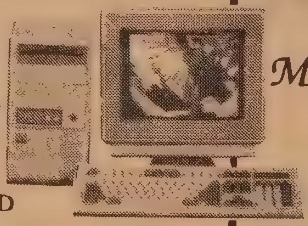

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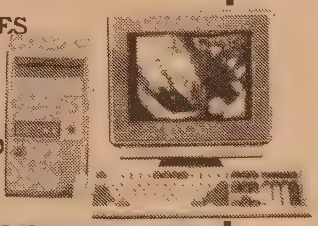

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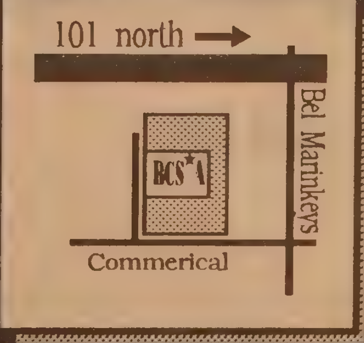

Under The Hood Of The 3DO Multiplayer

Interview With Rick Tompane, 3DO Vice President Of Technology

BY TONY REVEAUX

A new contender in the consumer entertainment arena is being readied for launch on October 1.

Trip Hawkins' 3DO, a savvy startup supported by Electronic Arts, Time Warner, and Matsushita Electric, has developed a new 32-bit multimedia technology platform that it's licensing to hardware and software manufacturers; it provides a playback and application platform for interactive home entertainment that promises to pack the visual punch of a graphics workstation.

The $700 Multiplayer, from Matsushita's Panasonic, will come with a 300K-per-second CD-ROM drive that can play audio CDs and Kodak Photo CD disks. Like CD-I, CDTV, and VIS, the Multiplayer outputs its display to an NTSC television instead of a computer. Fitted with ports to accept other third-party devices, it's positioned to support a wide range of MIDI, video, and television applications.

> People are excited about our system because it gets away from the clunky polygon-based and wireframe models used in the past.

But what's under the hood of the 3DO Multiplayer that provides all this three-dimensional, real-time, stereo action? We spoke to Rick Tompane, the vice president of technology for 3DO.

WHAT'S DRIVING THIS 3DO ENGINE?

If you take the classical computer architecture and stand it on its head, it might make more sense to you. First of all, it would have a processor; performance of the system is solely a function of how fast you can clock that processor or accelerate its functions, but the CPU ends up being the core of the system. That's not the case in our system. There's not a processor out there fast enough to do the kinds of things that we are doing."

NOT EVEN AN INTEL INDEO OR A SILICON GRAPHICS IRIS?

Not even close. There are different things that they do differently.

We've built a dedicated graphics engine that has two parallel processors that will do cel renderings. "Cel" is a reference to the way that animators used to do full-length motion pictures, where they layer celluloid acetate to

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Welcome to *MicroTimes*'s new section, MultiMedia & beyond. We need your help! In order to meet the increasing needs of our readers for the highest quality editorial and information possible, we are asking you to participate in our reader survey.

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---

1. What is your organization's primary business activity at your location?

☐ Aerospace
☐ Government
☐ Education
☐ Architecture, Engineering
☐ Communications: Advertising, Graphic Arts, Marketing, Public Relations, etc.
☐ Media: Broadcast, Film, Television, Publishing, etc.
☐ Manufacturing (computer, multimedia related): Computer/audio/video/audiovisual hardware, software, peripherals, etc.
☐ Manufacturing (other) ________________
☐ Dealer, retailer, distributor (other) ________________
☐ Accounting, Banking, Finance, Insurance, Real Estate
☐ Health, Medical, Legal
☐ Agriculture, Mining, Construction, Oil, Transportation, Utilities
☐ Research and Development
☐ Computer/multimedia contracting, consulting
☐ Consulting (other) ________________
☐ Other businesses and services ________________
☐ Other (please specify) ________________

2. Title: (Select one only.)

☐ Chairman/President/ Owner/Partner
☐ Vice President/General Manager
☐ Director/Department Manager
☐ Project Manager/Group Leader
☐ Creative Director/Designer/Producer
☐ Micro Manager/Coordinator/Specialist
☐ Network/Datacomm./Telecom Manager
☐ Manager/Supervisor (not listed above)
☐ Programmer/Analyst
☐ Architect/Engineer
☐ Specialist/Technician
☐ Scientist
☐ Educator
☐ Professional
☐ Consultant
☐ Representative
☐ Other (please specify) ________________

3. Department/Function: (Select one only.)

☐ Engineering/Technical
☐ MIS/DP
☐ Manufacturing/Operations/Production
☐ Administration/Management/Human Resources
☐ Accounting/Finance
☐ Advertising/Communications/Public Relations/Promotions
☐ Sales/Marketing
☐ Industrial design
☐ Corporate training
☐ Education
☐ Science/Research & Development
☐ Consulting
☐ Other (please specify) ________________

4. Which of the following operating systems are in use at this entire location? (Select all that apply.)

HW Operating Systems:
☐ DOS
☐ Windows
☐ OS/2
☐ Macintosh
☐ UNIX
☐ Other (please specify) ________________

LAN Operating Systems:
☐ Novell Netware
☐ Appleshare
☐ LAN Manager
☐ NFS
☐ Banyan VINES
☐ Other (please specify) ________________

5. Which of the following types of computers are used by you or members of your department or work group, or household. (Select all that apply.)

	Company	Household
IBM/Compatible 286 PC	☐	☐
IBM/Compatible 386 PC	☐	☐
IBM/Compatible 486 PC	☐	☐
IBM/Compatible Laptop/Portable	☐	☐
Other IBM Compatibles	☐	☐
68040 Macintosh	☐	☐
68030 Macintosh IIfx, IIci, IIcx, IIx, IIsi	☐	☐
68020 Macintosh II/LC	☐	☐
Macintosh Portable PowerBook	☐	☐
68030 Macintosh SE/30	☐	☐
Other Macintosh	☐	☐
Amiga	☐	☐
Workstation (HP, Sun, DEC, Silicon Graphics, NeXT, etc.)	☐	☐
Other Platform (please specify) ________________	☐	☐

7. In which ways are you personally involved in your organization's decision to purchase these products? (Select all that apply.)

A. Multimedia-related hardware and peripherals
☐ Determine needs/features
☐ Evaluate brands
☐ Specify/recommend brands
☐ Specify/recommend vendors/suppliers
☐ Authorize the purchase
☐ Other (please specify) ________________

B. Multimedia-related software
☐ Determine needs/features
☐ Evaluate brands
☐ Specify/recommend brands
☐ Specify/recommend vendors/suppliers
☐ Authorize the purchase
☐ Other (please specify) ________________

6. Please indicate which of the following products you plan to purchase for household or company use? (Select all that apply.)

Multimedia-related Hardware /Peripherals	Company	Household
IBM/Compatible PCs	☐	☐
Macintoshes	☐	☐
Amigas	☐	☐
Workstations	☐	☐
Color monitors	☐	☐
Presentation monitors	☐	☐
Multimedia upgrade kits	☐	☐
Audio boards	☐	☐
Graphics boards	☐	☐
Digital/Analog video boards	☐	☐
MIDI sequencers/synthesizers	☐	☐
LCD display panels	☐	☐
Desktop scanners	☐	☐
Mice/joysticks/input tablets	☐	☐
Color printers	☐	☐
CD-ROM drives	☐	☐
Laser disc players	☐	☐
VCRs and VCR controllers	☐	☐
Video cameras	☐	☐
Laser printers	☐	☐
Color proofers	☐	☐
High-resolution scanners	☐	☐
Color scanners	☐	☐
Storage devices	☐	☐
Networking systems	☐	☐
Supplies/accessories	☐	☐
Color Copiers	☐	☐
Other (please specify) ________________	☐	☐

Multi & Media beyond

Multimedia-Related Software	Company	Household
Authoring	☐	☐
Music composition/editing	☐	☐
Sound editing	☐	☐
2-D/3-D rendering/modeling	☐	☐
Animation	☐	☐
Desktop publishing	☐	☐
Draw/paint/image editing	☐	☐
Fonts	☐	☐
Presentation graphics	☐	☐
Clip art	☐	☐
Clip music	☐	☐
ip video/animation	☐	☐
Education application/titles	☐	☐
Electronic reference	☐	☐
Other (please specify) ________________	☐	☐

8. During the next 12 months, will you specify, recommend, buy, or approve the purchase of multimedia-related hardware, peripherals, software, or services worth: (Select one only.)

☐ $1,000,000 or more ☐ $500,000 to $999,999
☐ $250,000 to $499,999 ☐ $100,000 to $249,999
☐ $50,000 to $99,999 ☐ $25,000 to $49,999
☐ $10,000 to $24,999 ☐ $5,000 to $9,999
☐ Less than $5,000 ☐ None of these

9. In the last 12 months, did you specify, recommend, buy, or approve the purchase of multimedia-related hardware, peripherals, software, or services worth: (Select one only.)

☐ $1,000,000 or more ☐ $500,000 to $999,999
☐ $250,000 to $499,999 ☐ $100,000 to $249,999
☐ $50,000 to $99,999 ☐ $25,000 to $49,999
☐ $10,000 to $24,999 ☐ $5,000 to $9,999
☐ Less than $5,000 ☐ None of these

10. How many people are employed in your entire organization, including all its branches, subsidiaries, and locations? (Select one only.)

☐ 1000 or more ☐ 500-999 ☐ 100-499
☐ 25-99 ☐ Less than 25

11. What areas in your company do you see using multimedia? (Select all that apply.)

☐ Training ☐ Product announcements
☐ Corporate presentations ☐ Sales and marketing
☐ Other (please specify) ________________

12. How do you usually buy computer hardware, software, accessories, and supplies?

☐ Through a local retail store ☐ Mail order
☐ Catalog ☐ Direct from manufacturer
☐ Direct from distributor ☐ Other (please specify) ________________

Name: ________________
Address: ________________
City: ________________
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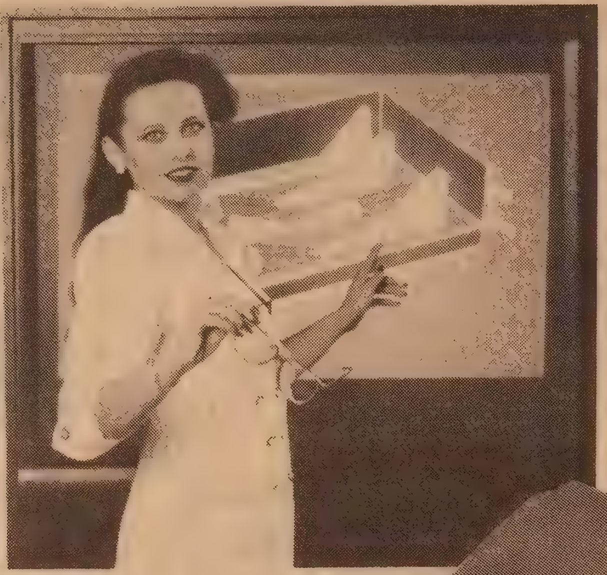
Thank you for your participation!
Please reduce & fax this questionnaire to (213)851-8303.



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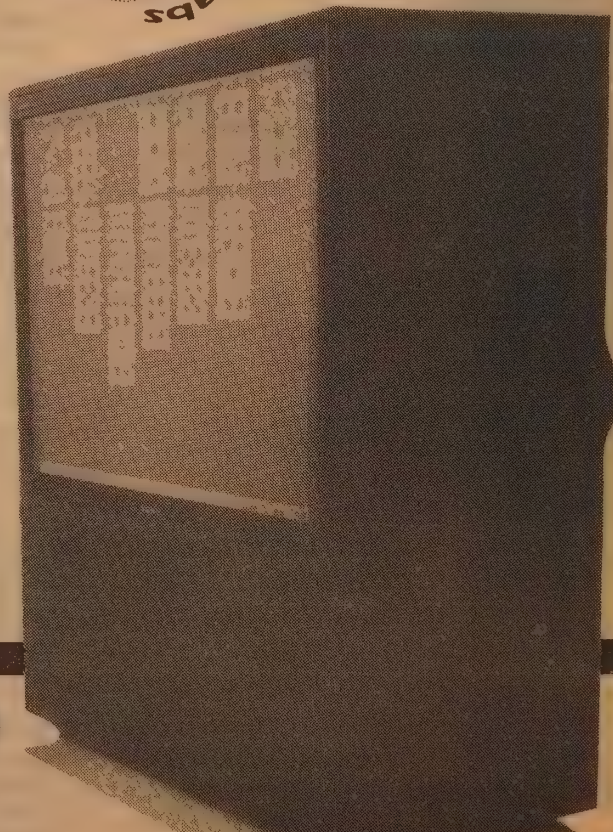

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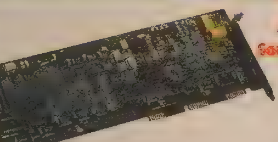

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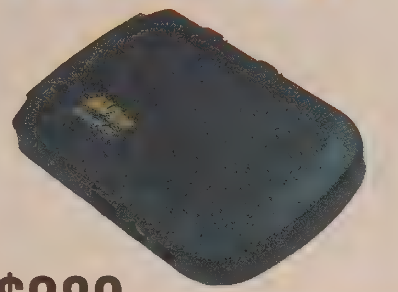

The flicker-free AVerKey encoder takes high quality graphics from any VGA system and enables you to produce them in superb quality for TV or video projection display. The AVerKey is the ideal converter for Windows and graphics applications with simultaneous display on both VGA and TV monitors. This is the ideal solution for cost-conscious executives and computer games enthusiasts that would like to get the maximum experience from their existing computer system. The AVerKey supports all IBM standard modes up to 640×480 resolution with any number of color for NTSC video.

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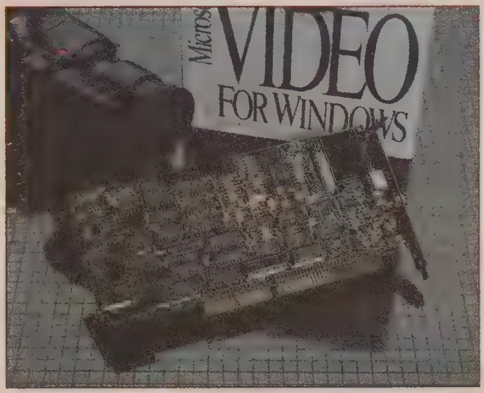

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QuickVIA is also supplied with an image capture program for DOS users. Captured images can be saved in all major file formats including TIFF, GIF, BMP, PCX, FLI, FLC, CUT, IMG and JPEG image compression.

Input: Composite or S-Video (Y/C) NTSC or PAL video signal.
Color Resolution: 15 or 16 bit RGB (65,535 colors) software selectable.
Video Window and Capture Size: 320 × 240, 160 × 120 and 80 × 60 pixels software selectable.
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Compatibility: Compatible with any VGA display adapter. No feature connector required.

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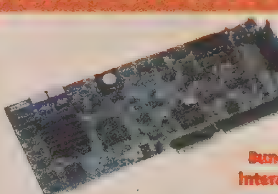
Pro 2000 with HSC Interactive



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Bundled with HSC Interactive software

The PRO 2000 is a New Media Graphics compatible overlay and capture board. It enables up to 3 video sources to be connected to a VGA system, and to display the live video image in full screen or in a scalable window. VGA resolutions up to 800×600 in 16-bit color mode. The audio volume, bass and balance control are software controllable.

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The perfect low cost accessory for converting your VGA graphics to TV video. The AV1000 will encode VGA resolution up to 640×480 and 256 color to video.

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The first low cost "PRO" Scan Converter for IBM and Mac

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Interactive Multimedia Solutions

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- *Video*

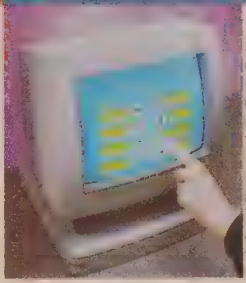
What is Interactive Multimedia?

Interactive Multimedia promises to revolutionize the way we work, learn, and communicate. By combining text, graphics, sound, animation, and video, interactive multimedia applications engage multiple senses and enable people to *interact* with information as it is presented. In time, multimedia will pervade all aspects of our lives: we'll communicate with our co-workers via voice and video electronic mail messages; our home or office computers will scan wire services, newspapers, and television programs to create personalized news; and companies and schools will offer interactive courses that allow students to learn and explore material at their own pace.

The fundamental hardware technologies for multimedia—including fast processors, audio support, high-resolution color displays, and CD ROM drives—exist today. In addition, new software such as Microsoft Video for Windows and Apple's QuickTime provide built-in multimedia capabilities to the general computing environment. Authorware Professional is multimedia authoring software that takes full advantage of these capabilities and allow the user to easily create quality content that extend the possibilities for multimedia beyond what other applications are providing today.

Digital Media Labs is leading these industry trends with innovative multimedia solutions. Whether your needs are in computer based training, performance support or multimedia business presentations, DML has a wealth of experience providing solutions on both the Windows and Mac platforms.

TouchMate



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TouchMate enables users to interact with their computer applications by simply, touching the screen where the information is displayed.

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create backgrounds and foregrounds and characters and objects in the scene.

SO WOULD THE DATA STREAM BE DESCRIBED HERE AS BEING FRAME-BASED RATHER THAN TIME-BASED?

No, it's really intended to be time-based. Good programming is always going to be time-based, but it allows the programmer to focus his energies more on the script and on the elements of style that represent good cinematic productions.

The heart of the system is these two animation engines. Everything in the system is built around supplying those cel animation engines with data to keep them fed—they always want more data to render. They are operating in parallel. Whichever one has the next available cycle, it will then render the next available pixel or cel. Surrounding that is a memory management architecture and 24 DMA [Direct Memory Access] channels that handle the data flow in and out of the engines as well as anywhere else in the system. That's how we get maximum memory bandwidth out of inexpensive video and DRAM [Dynamic Random Access Memory.]

HOW ARE THESE 24 CHANNELS OF DMA MAPPED?

There is a priority structure where different functions of the machine have different levels of priorities. For example, it's unacceptable to have audio be interrupted, because you'll get a loud pop, so audio is very high-priority, whereas you could not necessarily render every frame that you needed to, because it is time-based rather than frame-based.

SO WHAT YOU HAVE HERE IS DEMAND-DRIVEN FLEXIBILITY.

That's true. And one of the beauties of this is that that system offloads almost of all of the traditional graphics rendering functions that programmers have had to kind of push the limits on, writing a lot of very tight assembly code to get any kind of performance out of most traditional systems.

BECAUSE THOSE LINES OF CODE HAVE HAD TO BE DEDICATED.

That's right. So surrounding that have actually been three processors, one of which is a 32-bit RISC [Reduced Instruction Set Computing] processor. That happens to be core based on the ARM architecture, which is a very efficient 32-bit RISC architecture, very cost-effective per MIP of performance that you get. We also have a DSP [Digital Signal Processor] that handles all of the audio functions.

HOW MANY CHANNELS OF STEREO?

We can actually mix six full audio CD tracks into two

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Brand New 720KB DSDD

49¢ ea

or unformatted

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Color Coded,Wrap Around Labels $2.00 per 50
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3M

DC6150

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DC2120	120 MB	17.58
DC2120X	Ximat format QIC 80	21.95
DC600A	60 MB	17.98
DC6150	150 MB	18.58
DC6250	250 MB	23.95
DC6525	525 MB	27.28
Magnus	1.2 GB **NEW**	34.90
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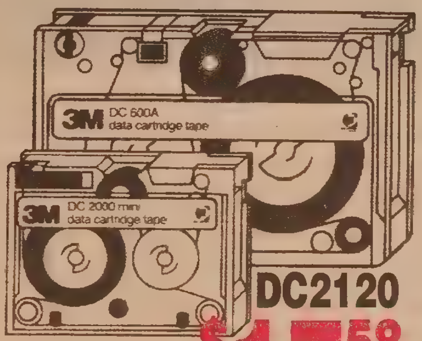

3M DC 600A data cartridge tape
3M DC 2000 mini data cartridge tape

DC2120

$17.58 Ea

Prices ea. for 2 - 10
Shipping: 40¢ per Cartridge

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Verbatim

Stock No.	Size	
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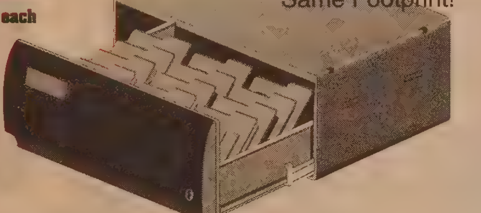
DC2120	Preformatted QIC 80	18.98
DC600A	60 MB	16.78
DC6150	150 MB	17.98
DC6250	250 MB	24.89
DC6525	525 MB	27.28

Prices ea. for 2 - 10
Shipping: 40¢ per Cartridge

Stackable Disk Drawers

$25.95 each

Both measure
13"WX7.25HX14.5D
Same Footprint!



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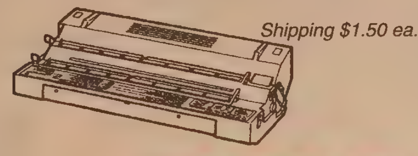

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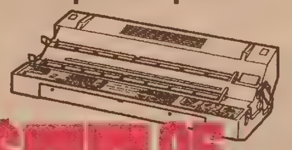

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with Auto brake

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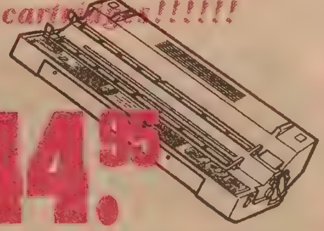

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Shipping 60¢ per pack

tracks simultaneously, and we can do a significant amount of 3-D processing within that DSP as well. It allows you to do those 3-D calculations in real time.

For example, you might be doing a simulation game of car racing. You would want to be able to calculate, in real time, the effects of another car coming up behind you and passing you. There is microcode here that will actually calculate the location in 3-D audio space, the doppler shift and phase difference, so that you can get a very realistic audio imaging model in your ears as to the location of a sound. It will also calculate the frequency filtering that your ears are used to hearing; you have to calculate the phase difference that your left and your right ears are going to hear.

That allows the developer to actually attach a sound effect to a particular vehicle or object in space. As it's moving in time, depending upon the input that you are providing, it will actually change the parameters of the sound effect that you hear to place it in 3-D space.

IT'S LOOKING AT IT AS IF IT WERE A SOUND SPRITE.

That's exactly what it is. In addition you can do preprocessing to create those same effects at the tool level. These audio effects and the video effects have not really been available at this price point in the past, not even on very high-end workstations.

> When we originally talked to the development community, the overwhelming majority already had Macintosh and Macintosh tools and preferred that as their primary development platform.
>
> But there is no set of 3DO GUI or other working environment. We're the blank page, so to speak.

Tell us more about the video component.

The third processor is essentially a video processor that's in the background, always pulling the data out that is frame-based, to handle all of the issues related to lookup table management, mapping it into the NTSC [TV] frame, and putting it up and doing the encoding on the NTSC side.

THIS, THEN, PROVIDES THE FOUNDATION FOR THE ABILITY OF THIRD-PARTY DEVICES TO ALLOW YOU TO EDIT YOUR HOME VIDEOS ON 3DO?

Yes. The ability to input video would be an optional enhancement from another manufacturer based around the core of the 3DO technology, and would probably be part of a product line of low-end and high-end models, just as in the rest of consumer electronics. People building their own music videos, for example.

WHAT ARE THE DEVELOPERS' TOOLS YOU'VE BEEN PROVIDING?

There's a whole suite of them, what we call Cinematic Software Tools. Not only do you have the traditional programming tools of C compilers, assemblers, symbolic debuggers, linkers, and editors, but there's a number of other tools. They are used to do file conversion, 3-D effects, tapping into the various folios that we have, and to coordinate those with the objects or the images that you have in your library.

There's a number of special effects that are obtainable by the system that have to do with lighting, shading, and transparency, all those kinds of things. We work with a number of third-party tools—things like Adobe Photoshop plug-ins, so that you can export 3DO-style images directly into Photoshop to edit them there.

BUT THE 3DO PLAYER STILL CAN'T INTEAFACE DIRECTLY WITH A COMPUTER?

The 3DO player is like a delivery mechanism. The producers are working on a standard Macintosh for all of their development work.

WHY WAS THE MACINTOSH CHOSEN AS THE DEVELOPMENT PLATFORM?

Because by far the majority of the developers already have that capability. We intend to support and extend the set of tools into some of the less popular but still common platforms, everything from Silicon Graphics to IBM-PCs, and other devices like that out there.

When we originally talked to the development community, the overwhelming majority already had Macintosh and Macintosh tools and preferred that as their primary development platform. But there is no set of 3DO GUI or other working environment. We're the blank page, so to speak.

HOW WILL THESE DEVELOPMENT TOOLS BE PACKAGED—LIKE STANDARD MACINTOSH SOFTWARE?

ROM disks that include all the code you need to begin developing for the 3DO system. We have a whole content library of hundreds of Mac-format CD-ROMs—still images, video clips, sound effects. We have gone out and acquired lots and lots of these things to help kick-start the business—one of the things we heard early on from many of our developers was the frustration they had in terms of being able to go get content and use it. This way, they can use it without restriction, as long as it's for a 3DO title. We've bought those rights for them already. We're a service company to the development community.

HOW DO YOU GET CONTENT THAT HAS BEEN AUTHORED ON THE MAC OVER TO THE 3DO MACHINE?

There's a box that they get that has a fiber-optic link to a card in the Macintosh as part of a hardware/software package. They can do all the content assembly and programming on the system; then they can download it into the target machine for full emulation and debug and all those kinds of things. The software development kit is about $29.95, and the hardware development kit is about $49.95. It's very low cost. In addition, we provide any upgrades that are neccesary.

CAN THE DEVELOPER THEN USE THIS LINK BETWEEN THE MACINTOSH AND THE PLAYER TO, IN A SENSE, HAVE A 3DO COMPUTER?

Not at this stage of the game. Computer companies inquire about potentially licens-

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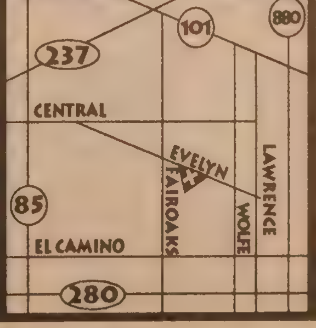

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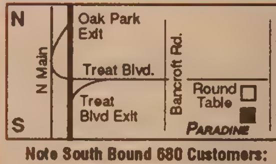

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ing our technology to make that happen, but that's still premature; right now we're focusing on getting the consumer product down and developing the standard. But there's nothing technically to restrict us from letting that happen.

> There is a priority structure where different functions of the machine have different levels of priorities. For example, it's unacceptable to have audio be interrupted, because you'll get a loud pop, so audio is very high priority.

ONE OF THE THIRD-PARTY ADD-ONS THAT HAS BEEN MENTIONED IS AN MPEG CARTRIDGE TO PLUG INTO THE PLAYER. WHAT WOULD THAT BE USED FOR?

When somebody wants to release music videos and movies on CD-ROMs, the player would then be able to take advantage of the MPEG standard, and be able to play those on the system. It's part of the Multiplayer concept, the fact that we support standard audio CDs, Kodak Photo CDs, interactive disks, and support movie disks as well. It's a cartridge now because the MPEG standard has not been completely stabilized; as soon as that happens, obviously we could support that."

Future generations of players might have that built into the firmware?

Exactly.

WHAT KIND OF INTERFACE DOES THE PLAYER HAVE, TO DEAL WITH THE VARIETY OF INPUT DEVICES COMING IN FROM THE CONSUMER ELECTRONICS SIDE?

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velop a standard interface so that the application developer doesn't have to need to know what it is. A standard controller will work whether it comes from Panasonic or AT&T or anywhere else. Similarly a modem or a keyboard or a mouse or a trackball or 3-D goggles would work universally.

So, for example, if they get a character call from a keyboard, whatever kind of keyboard or generic input mechanism there is, they will be able to do it, independent of what type it is.

LOOKING AHEAD—WAY AHEAD—HOW MIGHT YOU SEE 3DO SUPPORTING VIRTUAL REALITY IN THE HOME?

First of all we think that is a little bit further off; it's not something that people are screaming for.

I think that there's a lot of people who are interested in that, and once developers figure out how to bring those kinds of entertainment applications to the home, there will be even more interest.

> Everything in the system is built around supplying those cel animation engines with data to keep them fed.

The nice thing is that the people that we have talked to, doing those kinds of applications, are really excited about our system because the 3DO system is the first one that they've seen that has the kind of power and flexibility needed to get away from the clunky polygon-based and wireframe models that people have been using in the past.

We do think that there will be third parties in particular who will provide those kinds of software and peripheral products that would enable that to happen. It wouldn't surprise me at all to see someone develop a head-mounted tracking display viewer that operated in full 3-D, and had the ability to link that to other systems out on a network and a player in the home, and be able to have those experiences. It would have to be a hardware and software solution, but certainly our system would support that.

[This just in at press time, from MacWEEK: *"Macromedia has announced that three of its products, MacroMind Director, MacroModel and Three-D, will be bundled free with The 3DO Company's Authoring Toolkit for 3DO developers. 3DO licensed Director's file format, enabling users of the forthcoming 3DO Interactive Multiplayer to play back Mac Director files."]* ■

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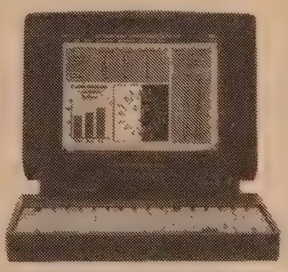

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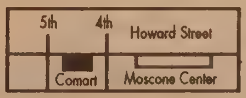

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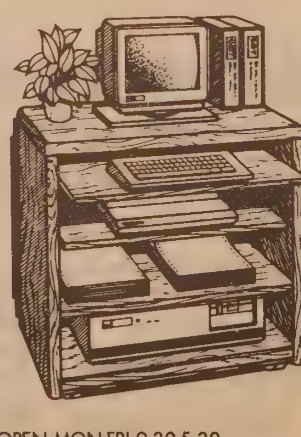

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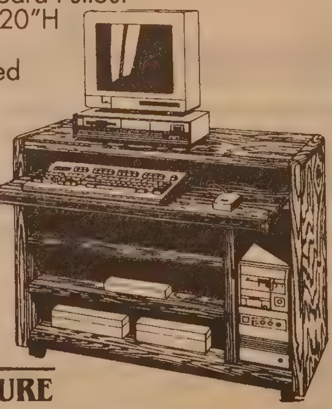

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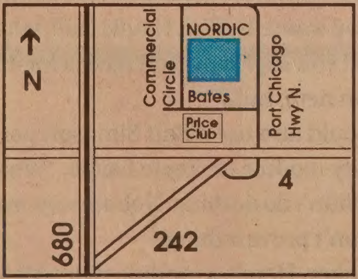

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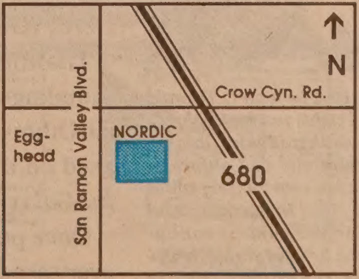

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What If You Talked To A Computer? And What If The Computer Talked BACK?

It would be a noisy world, that's what.

BY JOHN C. DVORAK

I've always thought the idea of voice recognition was not necessarily a good one. Who wants to hear an office full of people yelling at their machines? More recently I noticed people yelling at their machines anyway, so I figured, what difference would it make?

The key to voice recognition in a quiet office will be a technology that allows you to talk into a phone headset to interact with the computer. Kind of like calling home. On the other end is the computer. At some point the computer is going to talk back and talk back succinctly.

At first this talk back will be pretty bland: "Working, working. File retrieved."

DVORAK'S LAST COLUMN

At some point the computer voice will be given personality. You'll probably buy these personalities from a software vendor, either as a package of various personalities or perhaps expensive elaborate personalities. I expect to hear everything from a sexy female voice: "Oh, it's so nice to hear you again. What file was it that you wanted, dear?" I recall the old *Star Trek* episode where they were experimenting with the main computer and it kept calling Captain Kirk "dear," much to the chagrin of the crew.

There is also the officious computer voice, which might become popular. Let's not overlook the popular computer-as-slave: "I will get the file immediately, my master, sir!" The computer could even shout back at the user much like a Marine in boot camp. "I CAN'T HEAR YOU!!"

Traditionalists may want a computer-sounding computer, machine-voiced lisp and all. Others may want that bored robot sound used on the TV series *Hitchhiker's Guide to the Galaxy*.

Once personality modules are developed, every aspect of personality will be explored, from the sublime to the ridiculous. Soon virus writers will write code that will go in and turn the sexy siren, for example, into a stuttering slob. "I'll r-r-r-r-retrieve t-t-t-that d-d-d-d-date immediately! Hic! Belch! S-s-s-s-sorry! Burp!"

You can imagine some outstanding virus doing this to millions of computers at once.

To move us closer to the future, here are some ideas for both personality module designers and virus coders to ponder. Computer personalities of the future.

1) **Nerd I.** It's always popular to make the computer a wise-ass. Since day one, the coders of the world have inserted smart-ass retorts into code. Now the machine can actually sound like a snotty-nosed punk with that certain indescribable whine. "Oh. Smooth move. Whoever taught you to use computers? Or did any one *ever* teach you anything?"
2) **The Nagging Mom.** Some people just can't keep up the pace without some one nagging them to do everything. This is particularly true of teenage boys, many of whom use computers. "Did you make sure to put all the disks back in their sleeves? Do that before you do *any thing* else. And when, oh when, are you going to sort out the C: drive files? You have files scattered throughout the drive and there is no rhyme or reason to it..."
3) **The Goofball.** You could use this character to annoy your fellow workers by putting the computer on a loudspeaker. I suspect some of the voices might be licensed from Walt Disney. You could have Mickey and Donald and Goofy. Goofy would be particularly effective at annoying coworkers. "Hyulk! Golly, what was that you wanted? A file. Hyulk! Duh, what file did you say? Wow you have a lot of files on here, huh?"

   You could also use a Bart Simpson personality module to create havoc. "What file? I didn't do nothing. Nobody saw me. You can't prove a thing!"
4) **The Joker.** Here's a module that tells a joke to you every time you make a request. "Sure I'll get that file, but first, did you hear the joke about the two bears in the woods? The one bear comes across a campfire and says...."

   A variation on the joker is the philosopher who has some poignant one-liner to add to the conversation—a kind of Thought For The Day thing.
5) **The Yes Man.** This would be a very popular module in most of today's corporations. It would be available in both male and female versions. It would agree with you about everything and constantly praise you. "Get the Jones file? Great idea, boss. Good thinking! I'll have it for you right away. Sounds like a winner to me!"
6) **The Worry Wart.** What can I say? Some people love to work under a cloud of worry and uncertainty. The machine can ask you to reconfirm your every decision in a worrisome way. "Are you absolutely sure that you want to retrieve that file? It might be the wrong one. You're not going to accidentally erase it, are you? I mean, what if the machine crashes while I'm getting it? Anything is possible. Think about this decision."
7) **Animals.** I suppose one can get carried away and have animal noises come out of the computer instead of voices. Why not? A dog could bark so many times to mean yes or no. You might even have a variety of sounds from the machine. A moo or a meow would amuse everyone. I personally like the idea of a mooing computer. This might be particularly interesting as a screen-saver sound effect too. Imagine a roomful of these machines loaded with the cow module during the lunch hour—all mooing.
8) **The Whining, Complaining Girlfriend.** This is always good for the bachelor computer user. Every so often the computer can blurt out something like, "You never talk to me! We never do anything together. You don't take me anywhere. You never pay any attention to me. You take me for granted!"

These are just the tip of the talking computer iceberg. We can expect these modules and more goofy ones once the computer begins to speak. It should be funny. ■

© 1992 by John C. Dvorak. All rights reserved. John C. Dvorak graduated from the University of California. He is a contributing editor of PC Magazine *and* MacUser, *and is considered by many to epitomize the contrarian view of things—a charge that he vehemently denies. Dvorak's motto is: If you have nothing nice to say, then don't say anything at all.*

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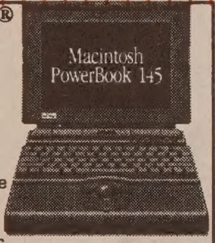

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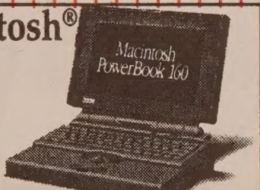

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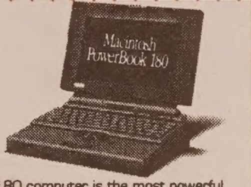

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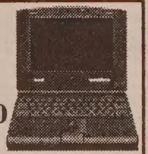

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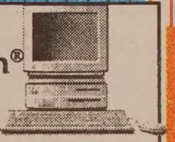

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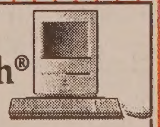

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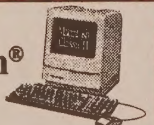

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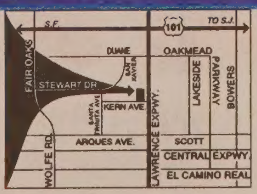

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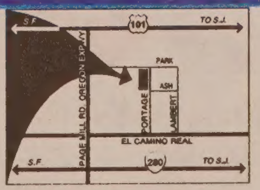

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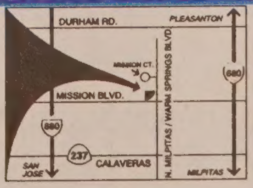

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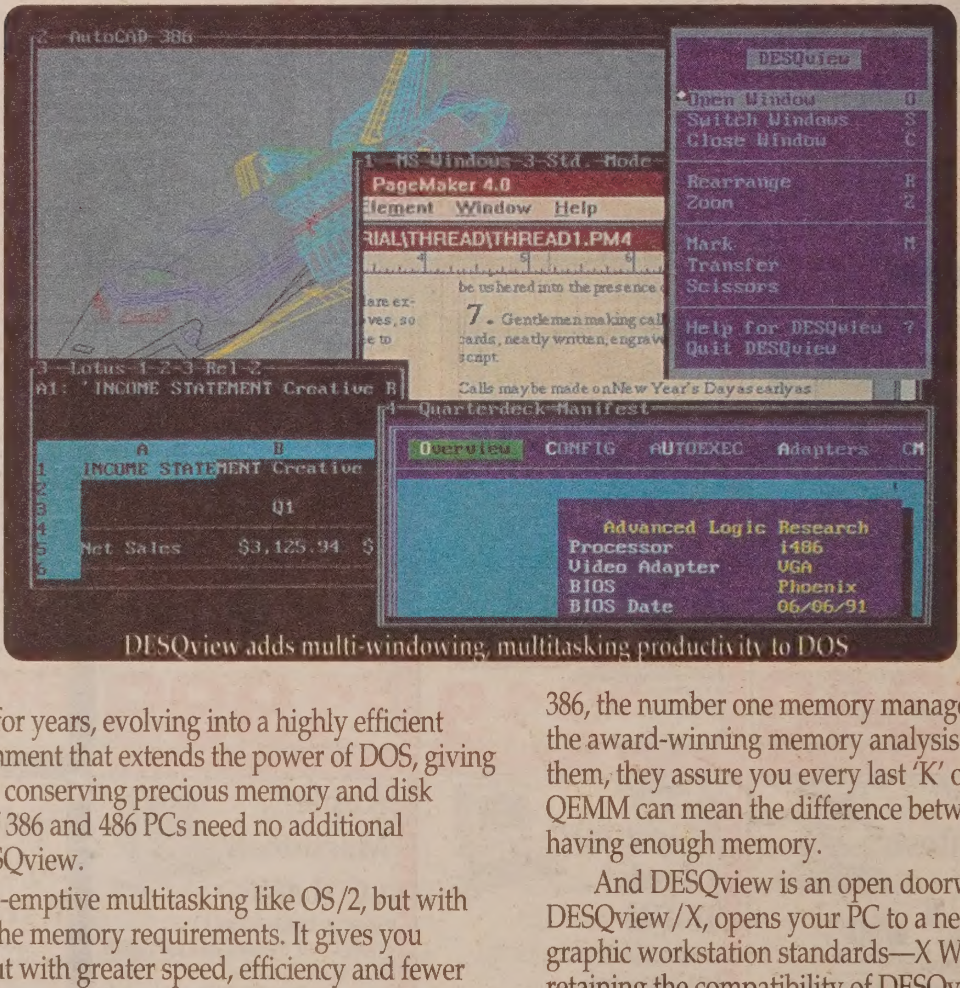

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If you like a program that only runs in MS Windows, like Wordperfect for Windows, DESQview 386 supports your choice. If you prefer a spreadsheet that runs in DOS, Lotus 1-2-3 Release 3, for example, we support that too. In fact, DESQview 386 lets you run your favorite DOS and Windows programs side-by-side.

Have Your Cake and Eat It, Too.

DESQview 386 comes with QEMM-386, the number one memory management utility, and Quarterdeck Manifest, the award-winning memory analysis and monitoring program. Between them, they assure you every last 'K' of memory is put to use.* In many cases, QEMM can mean the difference between running the TSRs you want and not having enough memory.

And DESQview is an open doorway to the future, too. Our next step up, DESQview/X, opens your PC to a network full of possibilities, including graphic workstation standards—X Window System software—all while retaining the compatibility of DESQview.

If you're as committed to DOS as we are, and feeling left out by the so-called industry leaders, take heart. There's no reason to leave DOS. If more productivity is what you need, we can provide it.

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* DESQview makes multitasking and windowing available to users of 286-class machines with similar memory efficiencies through QEMM-50/60 for IBM™ PS/2 50 and 60 users and QRAM for other 286 users. ©1992 Quarterdeck Office Systems. Trademarks are property of their respective owners.

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